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# MASSACHUSETTS BETTER BOATING

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## A Guide to Safety Afloat

FOURTH EDITION





Safety is a hugely overworked and often misunderstood word. It is essential in all matters, particularly so on water.

We believe that boating safety represents a way of life and an attitude of mind, primarily with the skipper. It is not to be confused with fear — most of us are not afraid to drive to work, and certainly the road hazards are greater.

Constant vigilance is the price of safety. Safety starts with an *attitude* and a *motivation*. It is nurtured by *experience*, and the net result is the competent boatman.

Safety begins with the right *equipment*; including, but not limited to, that required by law. It then goes on to the right operation. And in this respect there is no substitute for what is known as "the seaman's eye". This is your ability to judge what is happening to your boat and in your vicinity so that you may make the right decisions. When you achieve this you will find that you radiate confidence. This makes for happy and enjoyable boating.

We hope this course will be helpful in your learning process, even if you're an old pro, because **YOU** — the **CAPTAIN**, are the most important safety feature built into any boat, large or small.



Alfred F. Nataloni

Director

Division of Marine and Recreational Vehicles

# Final Skipper's Score Answer Cards

**INSTRUCTIONS:** After you have completely read the Better Boating manual, review the information and tear out one of the Answer Cards below. Fill out all the information and turn to page 80 to begin the multiple choice Final Skipper's Score boating quiz.

A box appears for each column marked A,B,C, and D. Select the *best* answer and use a pencil or pen to fill in the box next to the question number. Only one box should be marked for each question. If you change an answer, be sure to completely erase the first mark. When you have finished, mail the card for grading and processing. Your certificate of completion will be mailed to you after your answer card has been scored.



- TEAR ALONG DOTTED LINE

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(Please print)

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City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

County \_\_\_\_\_ Age \_\_\_\_\_

Signature \_\_\_\_\_

Do you own a boat? \_\_\_\_\_ H.P. \_\_\_\_\_

Type \_\_\_\_\_ Length \_\_\_\_\_

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TEAR ALONG DOTTED

# FLOAT PLAN



When you plan to boat, it is a good idea to leave a float plan like the one below with friends or relatives. It is designed to help officers find you in case of emergency. Instruct your friends to notify the Coast Guard, Division of Marine and Recreation Vehicles or local police if an emergency should arise.

1. TYPE OF BOAT	Outboard _____	Inboard _____	Sail _____	3. RADIO EQUIPMENT	a. Ship to Shore _____
a. Boat Number/Name				b. Citizens Band _____	c. Channel Monitored _____
b. Size _____	e. No. of Engines _____			4. TRIP PLAN	
c. Make _____	f. H.P. _____			From _____	Via _____
d. Capacity _____	g. Fuel: Gas _____ Diesel _____			Estimated Time of Arrival _____	Departure Time _____
2. NO. OF PERSONS ABOARD _____	Names/Addresses _____ _____ _____ _____ _____				
5. CAR PARKED AT _____ License No. _____					
6. I WILL ADVISE TRIP PROGRESS Phone _____ Time _____ Other _____					
7. IF NOT AT DESTINATION BY _____ (day) _____ (hr.) notify proper agency.					
Signed _____					

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From \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PLACE  
STAMP  
HERE

**Division of Marine  
and Recreational Vehicles  
100 Cambridge Street  
Boston, Massachusetts 02202**

----- TEAR ALONG DOTTED LINE -----

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HERE

**Division of Marine  
and Recreational Vehicles  
100 Cambridge Street  
Boston, Massachusetts 02202**

# INTRODUCTION

## Safety and the Laws

### Definitions

1. **Boating Accident** - An occurrence in which a water-borne vessel subject to state laws is involved, whether or not there has been any actual collision, and which results in damage by or to such vessel or its equipment, or by or to an object or person being towed, pushed or propelled by such vessel, or in which there is an injury to any person, loss of life, or disappearance of any person under circumstances which indicate the possibility of death or injury or disappearance of a vessel other than by theft.
2. **Certificate of Number** - A document issued by the director, upon application therefore, stating the name and address of the owner, and the number awarded to a vessel subject to state laws, except such vessels, other than livery boats, owned by a manufacturer or dealer in boats.
3. **Director** - The director of the division of M & RV.
4. **Ship's Lifeboats** - Boats carried aboard a vessel and used solely for lifesaving purposes, but not including dinghies, tenders, speed-boats or other types of craft carried aboard a vessel and used for other than lifesaving purposes.
5. **Underway** - Not at anchor, made fast to the shore or aground.
6. **Vessel** - Watercraft of every description, except a seaplane on the water used or capable of being used as means of transportation on water.
7. **Waters of the Commonwealth** - All coastal and inland waters as defined in section one of chapter 131, except ponds less than ten acres in area owned by one person, and not open to the public.
8. **Division** - The Division of M & RV.
9. **Horsepower** - The aggregate rated horsepower of all propellant machinery at maximum operation revolutions per minute.
10. **Length** - The extreme deck fore-and-aft measurement of a vessel.
11. **Livery Boat** - A boat hired or available for hire from a person who offers boats for hire as a regular business.
12. **Machinery** - All inboard and outboard engines and all other types of motors or mechanical devices capable of propelling vessels.
13. **Motorboat** - Any vessel propelled by machinery, whether or not such machinery is the principal source of propulsion, but not a vessel which has a valid marine document issued by the Bureau of Customs of the United States government or any federal agency successor thereto.
14. **Operate** - Navigate or otherwise use a motorboat or vessel.
15. **Operator** - A person who operates or who has charge of the navigation or use of a motorboat or vessel.
16. **Owner** - The person who claims lawful possession of a vessel by virtue of legal title or equitable interest therein which entitles him to possession.
17. **Secretary** - The Secretary of the Department of the United States government in which the Coast Guard is operating.

# CONTENTS

NOTE: The symbols identify parts and chapters and represent educational elements of BETTER BOATING.



BOATS



EQUIPMENT



NAVIGATION



SAFETY AFLOAT



FIRST AID

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Contents approved by the  
National Association of  
State Boating Law Administrators  
and recognized by the  
United States Coast Guard



# BOATS, BOATS, BOATS



## I. Chapter 1—Classification

- A. For registering and numbering of boats
- B. Required equipment varies according to class
- C. Four classifications according to length
- D. How to measure motorboats

## II. Chapter 2—Watercraft

- A. Runabouts— majority of recreational motorboats
- B. Canoes— double-ended, “people-powered”
- C. Kayaks— closed deck, “people-powered”
- D. Inflatables— usually neoprene-coated material
- E. Sailboats— day sailing, cruising or racing
- F. Cruisers— motorboats with overnight accommodations
- G. Day Cruisers— small cabin area

## III. Chapter 3—Sailboats

- A. Parts—hull, sail(s), centerboard and rudder
- B. Sailing principles
- C. Sailboat equipment
- D. Rules of the road

## IV. Chapter 4—Hull Design

- A. Planing or displacement
- B. Flat bottom
- C. Round bottom

## D. V-bottom

- E.. Deep V-bottom
- F. Cathedral
- G. Catamaran

## V. Chapter 5—Registration

- A. Registration
- B. Certificate of Number
- C. Exemptions
- D. Correct Display of Number
- E. Decals
- F. Certificate of Title

## VI. Chapter 6—Trailering

- A. Safety check list
- B. Bottom support
- C. Trailer load
- D. Hitch and drawbar
- E. Tongue weight
- F. Couplings
- G. Safety chains
- H. Wheel bearings
- I. Tires
- J. Trailer towing tricks
- K. Ramp etiquette

Boaters have the responsibility to keep informed about changes in state and federal regulations. This publication is intended as a guide only. For official law, refer to the Division of Marine and Recreational Vehicles State Boating Laws, Chapter 90-B and the accompanying rules and regulations.



# A SKIPPER'S TALE

## The Runaway Runabout

Allen brought his car to a stop on the steep launching ramp. He popped the automatic transmission into "park" and hopped out to help Jeff winch the runabout onto the trailer.

It had been a beautiful day for boating. The combination of hot sun, water's glare and two empty six-packs had left them feeling groggy.

Jeff winched the bow tightly against the trailer's bowstand as Allen fastened the hold-downs on the stern. After hooking the first hold-down, Allen looked away from the stern where he was standing and thought he felt the boat move toward him. He looked up at the entire unit and could see no movement. "I must be tired," he thought. He bent down to hook the other hold-down just as everything began to happen at once.

Allen had always been the "swifty" around the launching ramp. He could back a trailer like an interstate truck driver. His uncle had given him many lessons and had even shown him how to turn the trailer either way when he was backing up by putting his hand on the bottom of the steering wheel and moving the wheel the same direction in which he wanted the trailer to turn.

He had a ball trailer hitch mounted on the front

bumper to make it easier to get the boat and trailer down steep or difficult ramps. Even the tires on Allen's car were new.

But in his laid back condition, he had forgotten a couple of things. A car with the transmission in park usually has only one rear wheel locked; setting the parking brake locks both wheels. Allen had forgotten to set the parking brake.

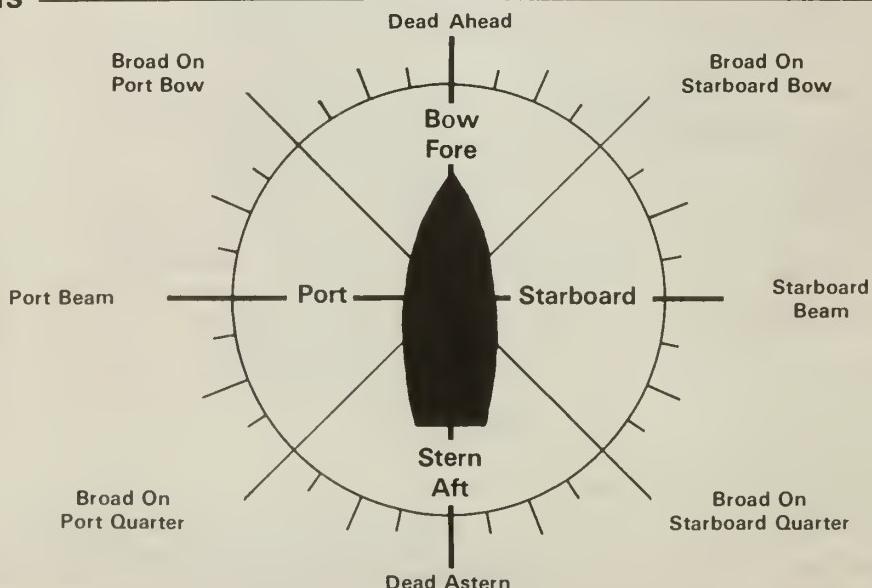
He had also forgotten that he wasn't the first person to use the launching ramp that day. Other boaters had not only been launching boats and pulling dripping trailers over the concrete ramp's slightly oily surface, but many had been loading boats out of the water, draining large amounts of water on the ramp.

Sure enough, the boat was moving...with just one rear car wheel sliding, the boat, car and trailer...the whole thing was moving backwards down the ramp. Allen jumped out of the way just in time.

The trailer jackknifed at the water's edge. The momentum smashed fiberglass, chrome trimmed running lights, trunk handle and stop lights in a series of loud crashing sounds. With a final crunch that lifted the boat almost entirely off the trailer, everything came to a stop.

An embarrassing situation? Very! Expensive? Of course. Dangerous? Possibly. How would you have prevented this accident?

## Skipper's Terms



Distinguishing between port (left) and starboard (right) can be confusing for many students. Remember that "port" and "left" match up as four-letter words, while "right" and "starboard" have

more letters. Port and starboard colors follow the same rule: port is red (short); starboard is green (longer). Port, left and red are all short words. Starboard, right and green are longer words.

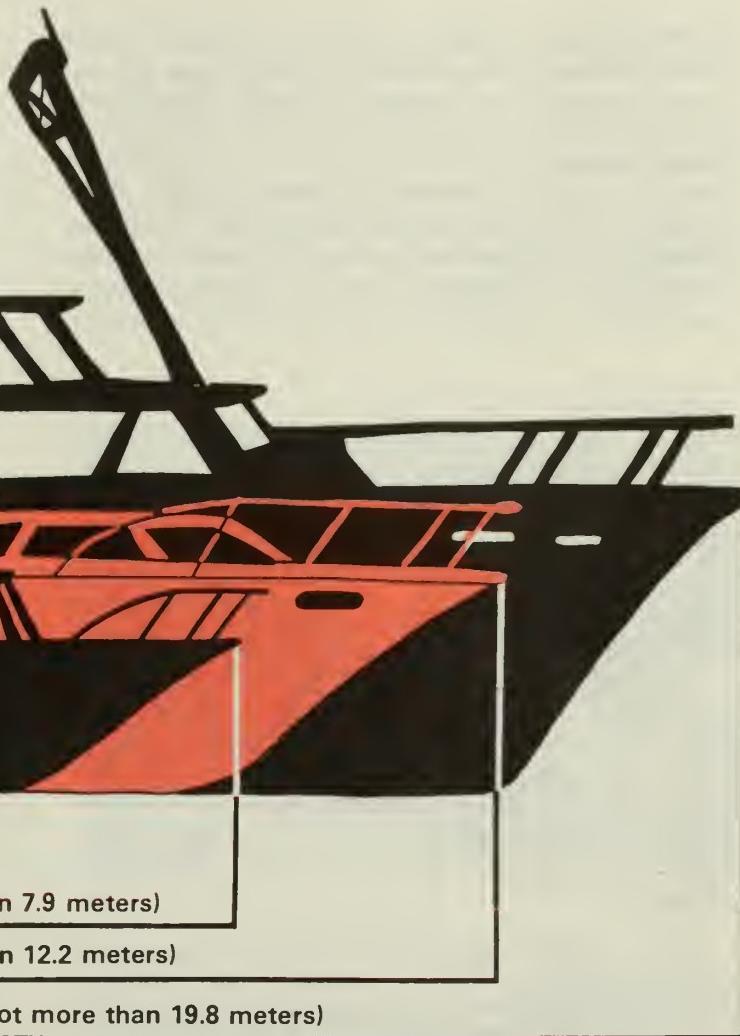


# Chapter 1 CLASSIFICATION

## Motorboats

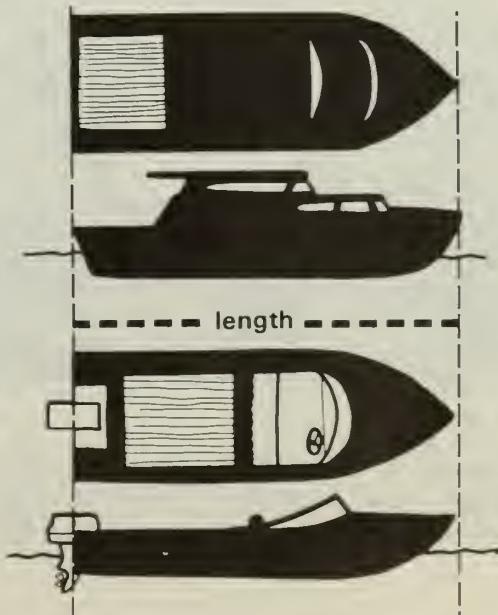
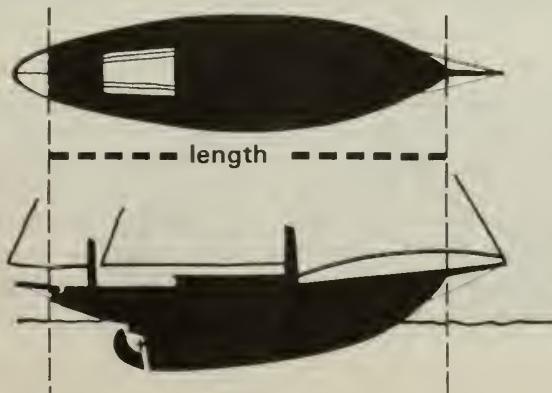
A motorboat is any boat equipped with propulsion machinery (a power driven boat).

Motorboats are divided into one of four classes according to length. Federal and state authorities use these classes to register and number a boat. Equipment required on a boat also varies according to class and type of propulsion. The four motorboat classes are listed below.



## How to Measure Length

A motorboat's length is measured from end to end, parallel to the centerline. Measurement is from outside hull planking or plating. Outboard motor brackets, fittings or attachments are not included. Some examples of length measurements are shown.





# **Chapter 2 WATERCRAFT**

Within each class are many types of boats. A safe boater must consider the craft's size, shape, proportions, seaworthiness, use and capacity. Many boats have motors. Others are used in sports where power is not needed.

There are many personal decisions to make about brand, cost and materials. Wood, steel, aluminum, fiberglass and ferro-cement are all used in boat building. All have good qualities. Choose the right one to fit your boating needs.



### **Runabouts**

Most runabouts are under 26 feet (Classes A and 1) and may be powered by an inboard, outboard or in-board/outdrive motor. The runabout is ideal for water skiing, fishing and cruising.



### **Canoes**

Canoes, usually "people-powered," can be equipped with small, low horsepower motors on side mounts. Canoes are most often double-ended, pointed at both

bow (front) and stern (back). Some have outriggers or motor mounting brackets. Others have square sterns that form motor *transoms*. Canoes are generally round-bottomed and they can be very unstable if not used properly.



### **Kayaks**

Kayaks are also people-powered. Most modern kayaks are constructed of canvas, fiberglass or wood. They are light and strong, gliding easily through the water. Kayaks have closed decks with cockpit areas for one or two people.



### **Inflatables**

Inflatables are made from neoprene-coated fabric which is resistant to heat and saltwater. Inflatables are easy to move from place to place. They can be pumped up quickly with a foot pump. Inflatables are very buoyant and quite stable. They should have several air chambers (or compartments) so that the boat will still float even if one of the chambers is punctured by accident. Be careful not to drag inflatable boats or scrape them on rocks or rough surfaces. Inflatables may be constructed for use with or without power.





# WATERCRAFT



## Sailboats

Recreational sailing falls into three main classifications: day sailing, cruising and racing. Boat hulls are designed to meet the specific requirements of each category. Many types, sizes, and rigs (sail and mast arrangement) are available to the sailor. Some sailboats also have power. All sailboats respond in the same basic ways to the forces of wind and water.



## Cruisers

A cruiser is a motorboat with overnight accommodations. These include sleeping berths (bunks), a dinette, a head (lavatory) and a galley (kitchen).

Cruisers generally start at about 18 feet in length and run on up to 50 feet or more. The largest are usually referred to as motor yachts. Two basic types of cruisers are the express cruiser, which has the main cabin occupying the front half of the boat and a large

after deck and steering station in the rear, and the sedan cruiser that features a very long cabin enclosing almost the entire boat.

Express cruisers are better for fishing and activities where a large open deck is important while a sedan cruiser makes a more practical live-aboard boat. Frequently a manufacturer builds the sedan and express models on the same hull with identical power and performance. Either may be equipped with a command bridge.



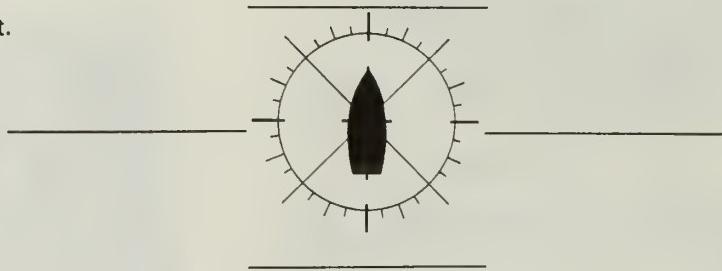
## Day Cruisers

Day Cruisers are small express type cruisers with the forward cabin areas limited to a couple of bow bunks and storage areas. Many in the 18 to 24-foot sizes have heads, and limited galley areas. A large open deck makes this type of boat excellent for fishing and other water sports.



# **SKIPPER'S SCORE**

1. What is a motorboat? \_\_\_\_\_
2. Motorboats are classified according to \_\_\_\_\_. \_\_\_\_\_.
3. Class A motorboats are less than \_\_\_\_\_. \_\_\_\_\_.
4. Class 3 motorboats are \_\_\_\_\_ feet to not more than 65 feet long.
5. Materials used for making boats include: \_\_\_\_\_
6. Canoes have round bottoms and can be very \_\_\_\_\_. \_\_\_\_\_.
7. Identify the following positions:  
stern, bow, port, starboard, fore, aft.



8. Motors are most often located in the \_\_\_\_\_ of boats.
9. Give one advantage and one disadvantage of an inflatable boat.

Advantage: \_\_\_\_\_

Disadvantage: \_\_\_\_\_

10. A boat's port side is on the \_\_\_\_\_.
11. A boat's starboard side is on the \_\_\_\_\_.
12. Identify the following boats:



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



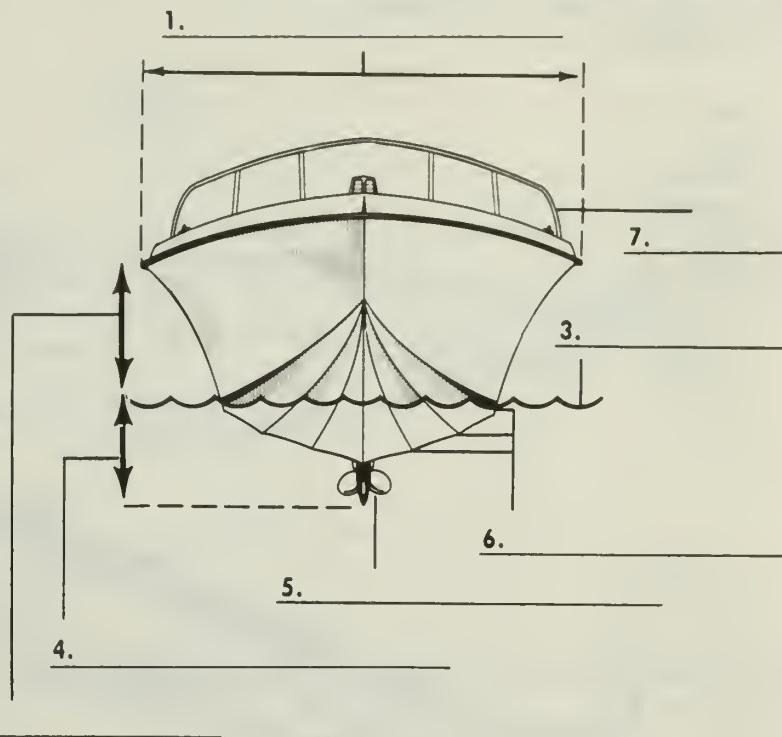
\_\_\_\_\_



# SKIPPER'S SCORE

Label the parts of this motorboat by matching the numbers on the list with those on the diagram.

1. Beam
2. Freeboard
3. Waterline
4. Draft
5. Propeller
6. Chines
7. Rail
8. Outboard Motor
9. Stern Light (white)
10. Steering Wheel
11. Chock (open)
12. Eye Bolt
13. Combination Light (red, green)
14. Windshield
15. Cleat



2. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

4. \_\_\_\_\_

13. \_\_\_\_\_

9. \_\_\_\_\_

13. \_\_\_\_\_

8. \_\_\_\_\_

15. \_\_\_\_\_

Port

14. \_\_\_\_\_

Stern

Bow

Starboard

12. \_\_\_\_\_

11. \_\_\_\_\_

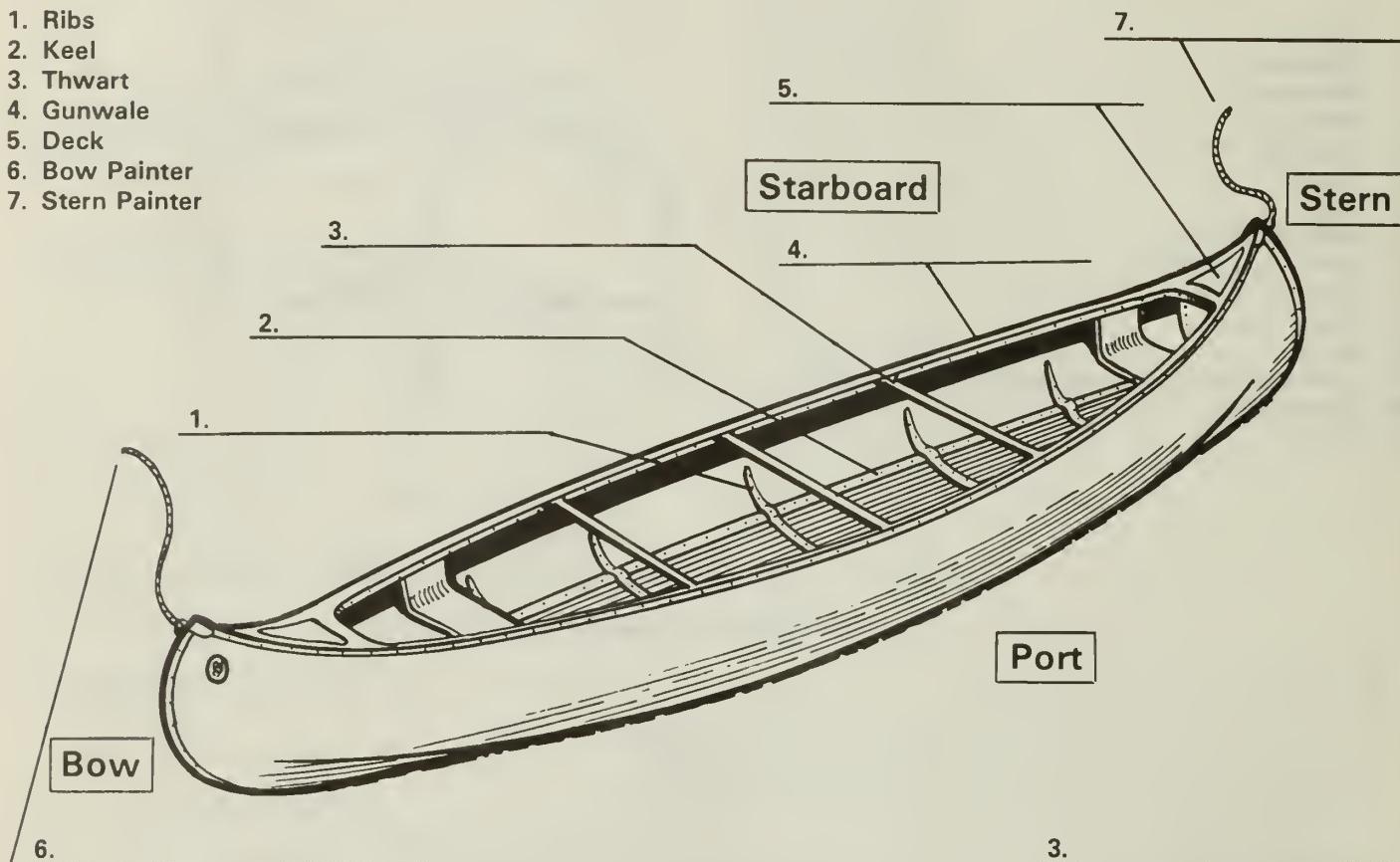
10. \_\_\_\_\_



# SKIPPER'S SCORE

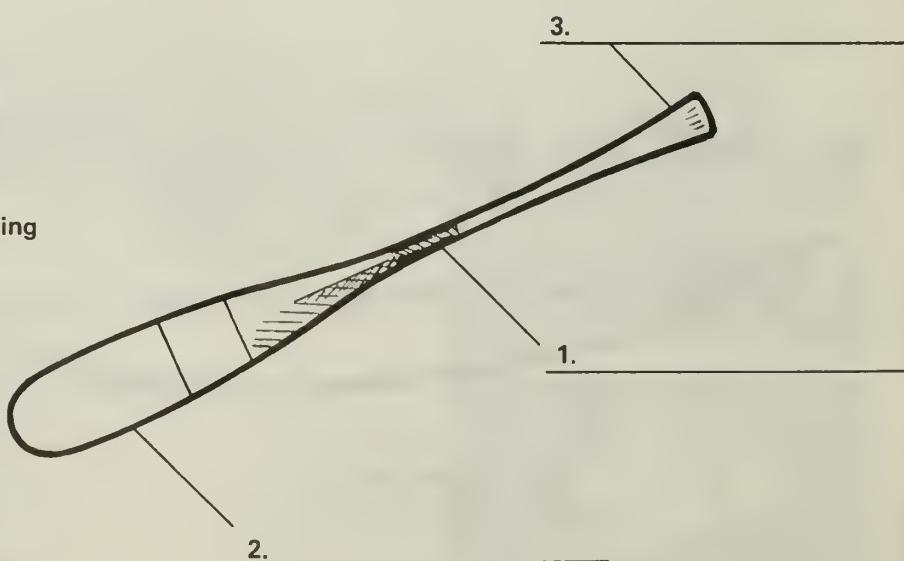
Label the parts of this canoe by matching the numbers on the list with those on the diagram.

1. Ribs
2. Keel
3. Thwart
4. Gunwale
5. Deck
6. Bow Painter
7. Stern Painter



Label the parts of this paddle by matching the numbers on the list with those on the diagram.

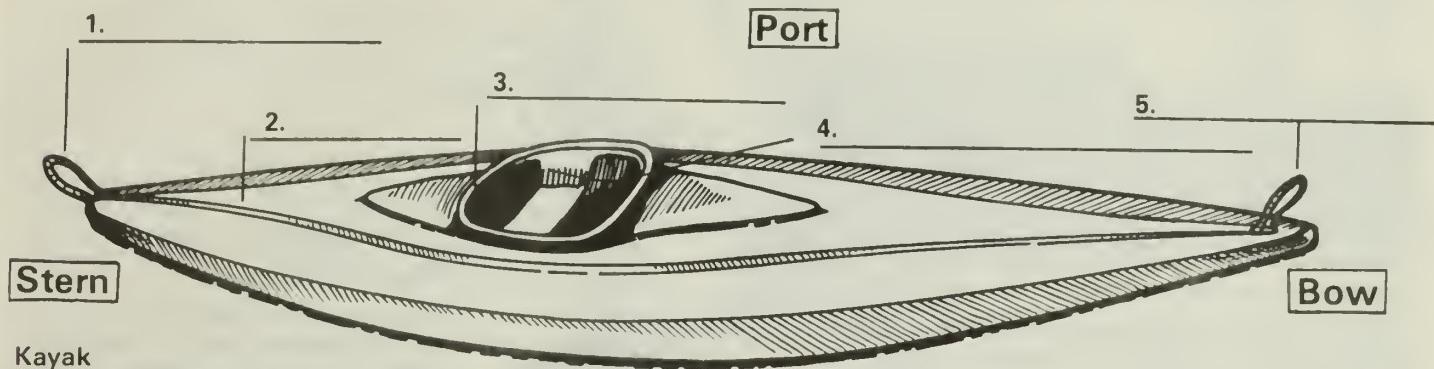
1. Shaft
2. Blade
3. Grip





# SKIPPER'S SCORE

Label the parts of the kayak, kayak paddle and inflatable by matching the numbers on the list with those on the diagram.



#### Kayak

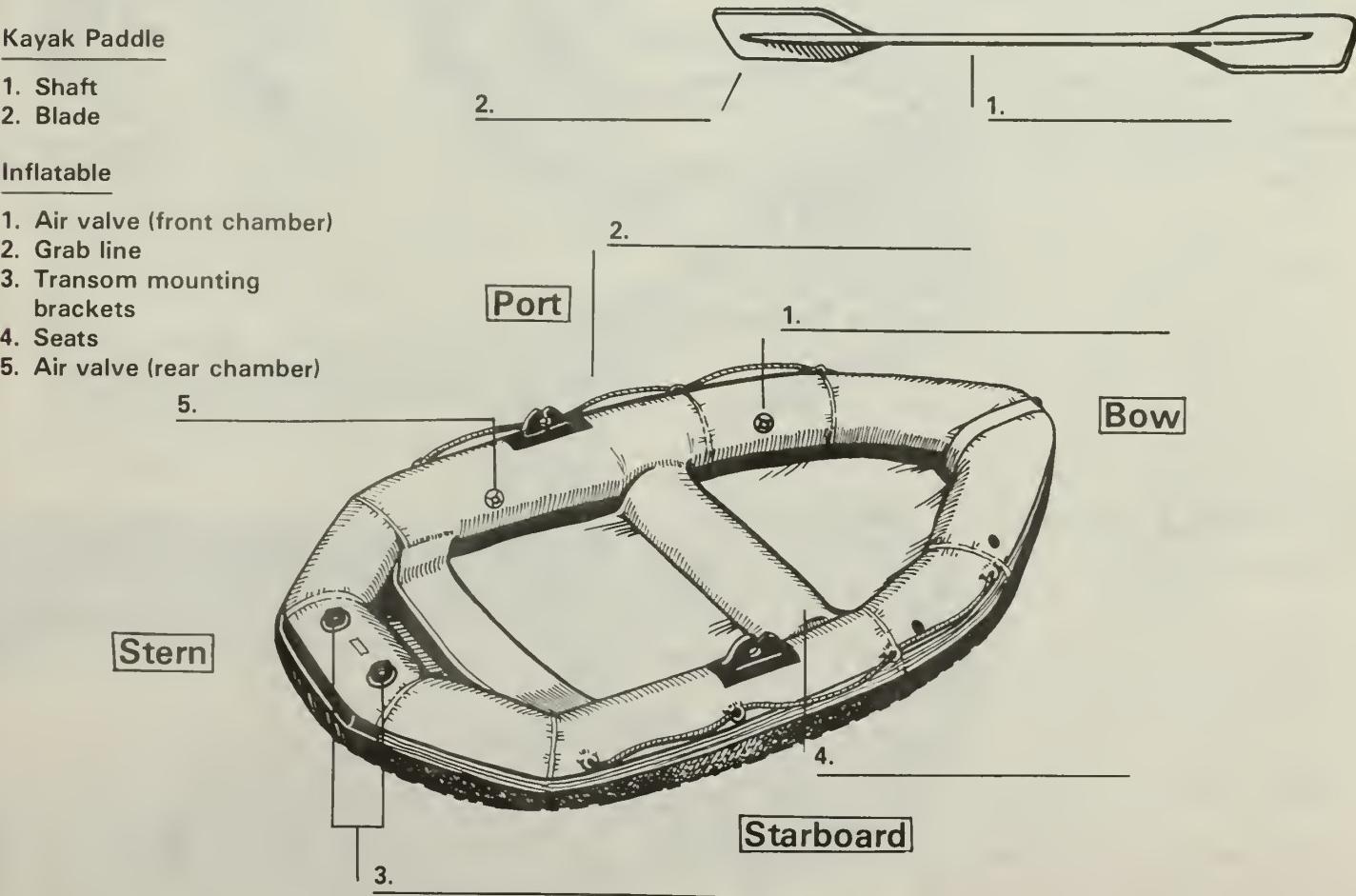
1. Stern grab loops
2. Deck
3. Molded cockpit lip
4. Cockpit seat
5. Bow grab loops

#### Kayak Paddle

1. Shaft
2. Blade

#### Inflatable

1. Air valve (front chamber)
2. Grab line
3. Transom mounting brackets
4. Seats
5. Air valve (rear chamber)





# RIVER RUNNING FUN

**Know your put-in point and your take-out point before you begin**

- Travel in groups of at least three boats while on the river. Keep the boat behind you in sight.

## DANGER!

If the river disappears, you may be approaching a waterfall

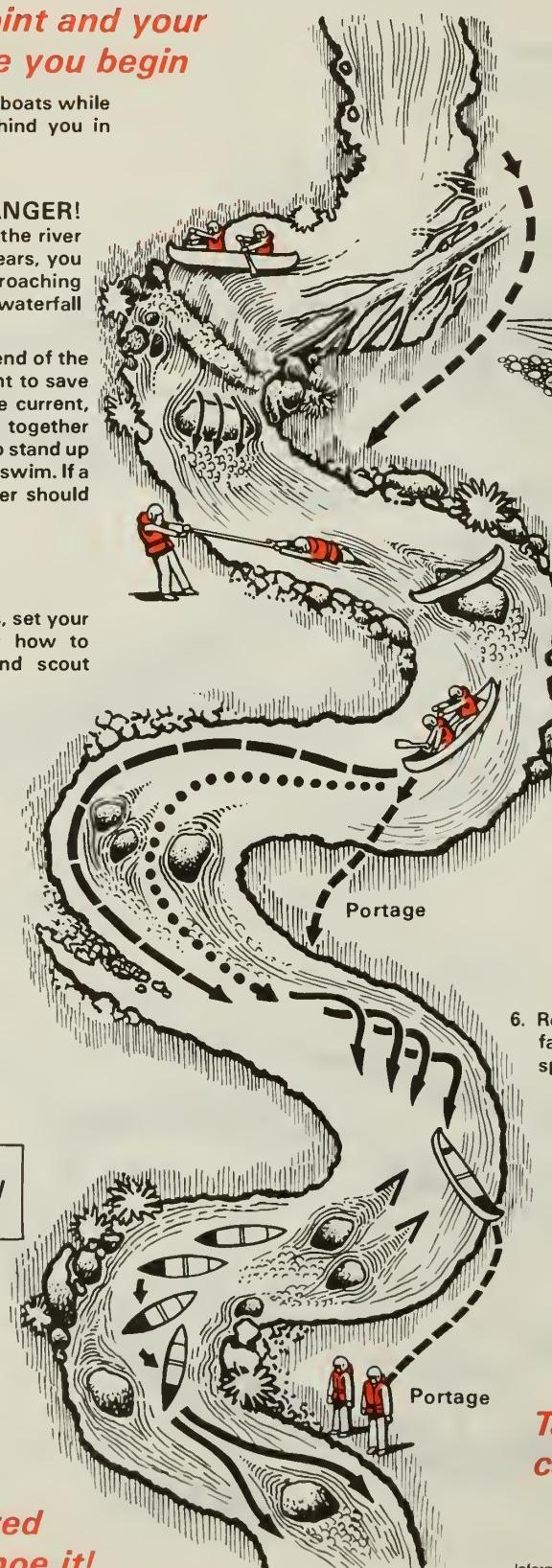
- Capsized? Stay at the upstream end of the canoe. Your life is more important to save than equipment. If carried by the current, keep your toes up and your feet together pointed downstream. Never try to stand up unless the water is too shallow to swim. If a heaving line is tossed the rescuer should secure it to a tree or boulder.

- When you approach obstructions, set your course well in advance. Know how to approach. If in doubt, stop and scout from shore.

— — — High water course

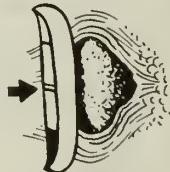
● ● ● ● ● Normal level course

STERN BOW



- Things to avoid; flow through hazards, waterfalls, low dams, high rapids and hydraulics. Even in slow water these can be very dangerous.

- When striking an obstruction sideways, lean the canoe downstream, but don't get caught between the canoe and the obstruction. With the upstream gunwale up, the canoe will be easier to remove from the rock.



Upstream gunwale up

Downstream gunwale up

- Remember, the river current is usually faster on the outside of a bend. It also spirals (folds under) down to the bottom.

- Upstream V's indicate rocks. Downstream V's with haystacks indicate gaps between rocks.

- When leaving, secure all equipment and carry trash out with you.

**Take a Red Cross sponsored canoeing course**

**If you are not prepared  
to swim it; don't canoe it!**

Information courtesy American Red Cross



# RIVER RUNNING FUN

River float trips in canoes, kayaks and rafts are becoming more and more popular throughout the entire nation.

The float trip season generally lasts from May to September or longer where a warmer climate permits. Mid-summer, after the spring run-off has filled rivers and streams, is the time when most trips occur. Temperatures ranging from 60-90 degrees F (16-32 degrees C) in the daytime and 40-70 degrees F (4-21 degrees C) at night are suitable for float trips.

The adventurous may float in an assortment of scenery, from meandering rivers through flatland forests to cascading mountain streams. Distances range from day trips less than 10 miles to voyages lasting weeks over hundreds of miles. A field of additional sports are available for the floating enthusiast including fishing, camping, swimming and hiking.

But whatever the schedule and wherever the trip takes place, the floater will find fascinating geological formations, an abundance of wildlife, historical sights and perhaps lots of cold spray.

Basic safety rules are as important for enjoyable river running as for powerboating or sailing. Use the following points as a guide for your next, or your first, float trip.

1. Be sure each passenger in the boat wears an approved *Personal Flotation Device* (PFD) that fits correctly.
2. Don't overload the boat with either passengers or gear.
3. Check your equipment before starting out. If you are using an inflatable raft, make certain there are no punctured chambers.
4. Be familiar enough with the route to plan for proper paddles and/or motors. Pack appropriate



camping gear, first aid supplies, warm, easily dried clothing, insect repellent, fishing gear and license, food, tarps and camera. Do not forget to waterproof your personal gear.

5. Be sure of your skills by starting with an easy run. If possible go with experienced river runners to learn the basic strokes and movements of the craft through various types of water.
6. Do not boat alone. Two boats are the usual minimum for a white water run.
7. Fasten down all ropes so that there is no danger of becoming entangled in case you overturn.
8. Beach your vessel overnight a safe distance from the river's edge and tie it securely to a tree or large rock in case of flash flooding, etc. Then carry it back to the water, do not drag it.
9. Stop, get out of your boat, and look over from shore all rapids and other danger spots. If in doubt, carry your boat around the difficulty.
10. Beware of overhanging trees, log jams, brush piles and other obstacles that the water flows through rather than around. You can be pinned against them, possibly under the water, by the force of the current. Pass them on the safe side. Do not grab limbs or debris to control the boat's direction. That's a quick way to swamp!
11. Do not try to run dams. You can be trapped in the recirculating current at the bottom.
12. If you overturn, stay on the upstream side of your boat so that you will not be crushed between it and a rock. In most cases stay with the boat since it won't sink. Don't try to stand in a fast current.
13. Cold water can be paralyzing to both mind and body. Get out of it quickly. Do not lose your life trying to save your boat.
14. Be alert to changing weather conditions while on the water. Get out of the water before a storm hits.





# Chapter 3 SAILBOATS

## Sailboat Parts

Sailboats have four basic parts: a *hull*, sail(s), *centerboard* (or *keel*) and rudder.

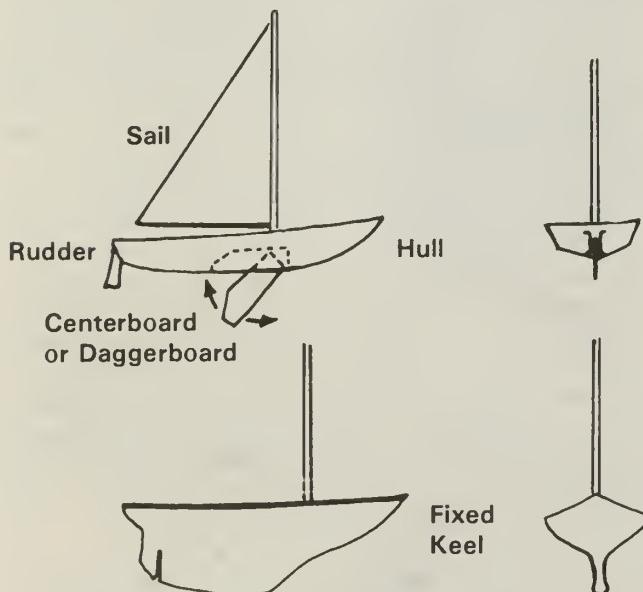
Hulls are designed to accommodate the crew, support the mast and rigging, and move through the water easily.

Larger boats have heavy *ballast* or weight packed into the bottom of the boat to prevent tipping. Smaller boats rely on the weight of passengers.

Sails convert wind pressure into movement of the hull. This is done through design, material, craftsmanship, and proper operation and maintenance. Most sails on recreational and competitive boats are made of synthetic material. Because synthetic fibers can be damaged by sunlight, sailors remove the sail or cover it when not in use.

Small sails may be folded after they are dry. They should not be wrinkled because it prevents air from flowing smoothly over the sail's surface.

All sailboats have a stabilizer called a *centerboard* or *keel*. This helps prevent tipping over or capsizing. It also keeps the boat from sliding sideways (*leeway*) when going across the wind.



Small sailboats use a centerboard. It may be raised or lowered into the water as needed.

Larger sailboats use a fixed keel. The keel is part of the hull. It carries additional weight, usually lead or cement. The weight of the keel offsets pull from the sail.

The rudder is located at the stern (back) of a boat. It is used to steer the sailboat. Small sailboats have

wooden or metal bars called tillers fastened to the top of the rudder. A tiller is the same as a steering wheel on a motorboat. When the tiller is moved to one side, the rudder moves the boat to the opposite side. A sailboat must be moving for the rudder to work.

## Why A Sailboat Sails

Two principles are at work when a boat sails. A boat sailing downwind or running is being pushed by wind. A boat sailing against the wind or beating is being pulled by wind. A boat sailing with the wind *abeam* (reaching) is using both principles. Reaching is the fastest and easiest way to sail.

When sailing there is a gradual change from one principle to the other. Therefore, sailors must be constantly aware of the wind and its direction. Developing this awareness is essential and difficult for a beginner.

**Starboard tack** means the wind is blowing on the right side of the boat. **Port tack** means the wind is blowing on the left side of the boat.

Looking at the illustrations at the bottom of the next page, it is easy to see how sailboats move closer or further away from the direction of the wind. Maneuvers close to the direction of the wind start with a beat. When beating as near as possible into the wind at about 45 degrees, the boat is close-hauled.

As a boat sails away from the wind it moves on a **close reach** and then a **reach** when abeam to the wind. As it moves further from the wind it enters a **broad reach** and then a **run** where the wind is almost directly behind the boat.

To turn a sailboat's bow through the direction of the wind is called a *come about*. An example of this is changing *tack* from one *reach* to another by sailing the bow through the wind.

Turning the boat from one **broad reach** to the other by moving the stern through the wind is termed *jibing*. The boom on the mainsail must be hauled in when a boat jibes. A wildly swinging boom can knock someone from the deck or tip the boat over. This type of knockdown is called an uncontrolled jibe.

Boats can also change tack from a **broad reach** by coming about with the bow into the wind. This method usually takes longer, but it is safer for an inexperienced sailor.

A constant hazard to the sailboater is a knockdown. It is most likely to happen when sailing on a reach at right angles to the wind, especially if the boat is moving slowly. A strong gust of wind can blast the sails over and onto the water if an unwary skipper has the main sheet and jib cleated tightly.



# SAILBOATS

## Sailboat Equipment

U.S. Coast Guard regulations require all sailboats to carry personal flotation devices as noted on page 33. All vessels under 12 meters (39'5") including sailboats must have aboard some means of making proper sound signals whenever necessary (see pages 30 and 36). When sailing after sunset, sailboats are required to show lights (page 31).

Good sailors carry more than the minimum required equipment and the following is recommended:

1. Bailer, to remove excess water. Use a sponge, can or pump. Water in the *bilge* decreases stability.
2. Lights, although not required in the day time, should be installed in case the wind stops blowing and you can't get back before sunset.
3. Paddles or *oars*, to use when sails are lowered or during periods of calm. Sailboats with auxiliary power should also carry paddles or oars.
4. Anchor, to keep from drifting with currents, waves or high winds.
5. Extra line, in addition to a bow line permanently attached to the craft.
6. Boathook, to use when pushing off during a landing. Also to pick up mooring lines.

## Rules of the Road

In 1980, The Inland Navigational Rules were rewritten to unify and modernize the procedures for preventing collisions on U.S. inland waters. The revised rules went into effect in December 1981 (March 1983 on the Great Lakes.) Previously, several different sets of rules existed, including many

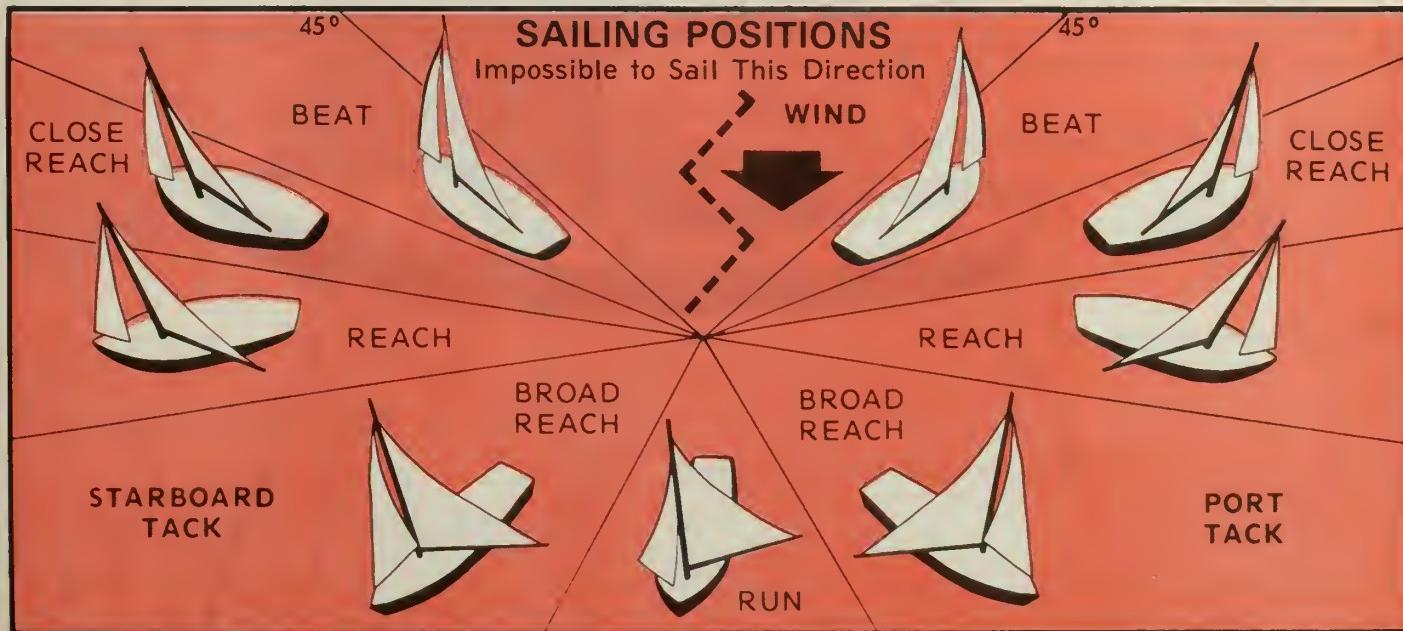
conflicting regulations. An effort was made to make the new Inland rules agree with existing International rules.

Major changes were made in the Inland rules governing sailboats. When sailboats approach one another, the *give-way (burdened)* vessel must stay clear of the *stand-on (privileged)* vessel. The following rules determine which boat is the give-way vessel and must yield the right-of-way in any situation where the danger of collision exists.

1. If both boats are on opposite tacks, the boat on the port tack gives-way to the boat on the starboard tack.
2. If both boats are on the same tack, the boat to windward must keep out of the way of the boat to leeward. In other words the boat farthest from the direction from which the wind is blowing has the right-of-way.

There are also rules of the road which sailors must know to avoid collisions with other types of boats. Generally, boats under sail have the right-of-way over motorboats, *unless the sailboats are overtaking another vessel*. If a boat is operating with both sail and power, it is classified as a motorboat. Sailboats must stay clear of larger vessels that are restricted to narrow channels and commercial boats that are fishing with nets, trawls, etc.

Some situations call for common sense. For instance, sailors should keep out of the way of large power boats. Sailboats should not change course when approaching motorboats. This makes it more difficult for the motorboats to pass safely.

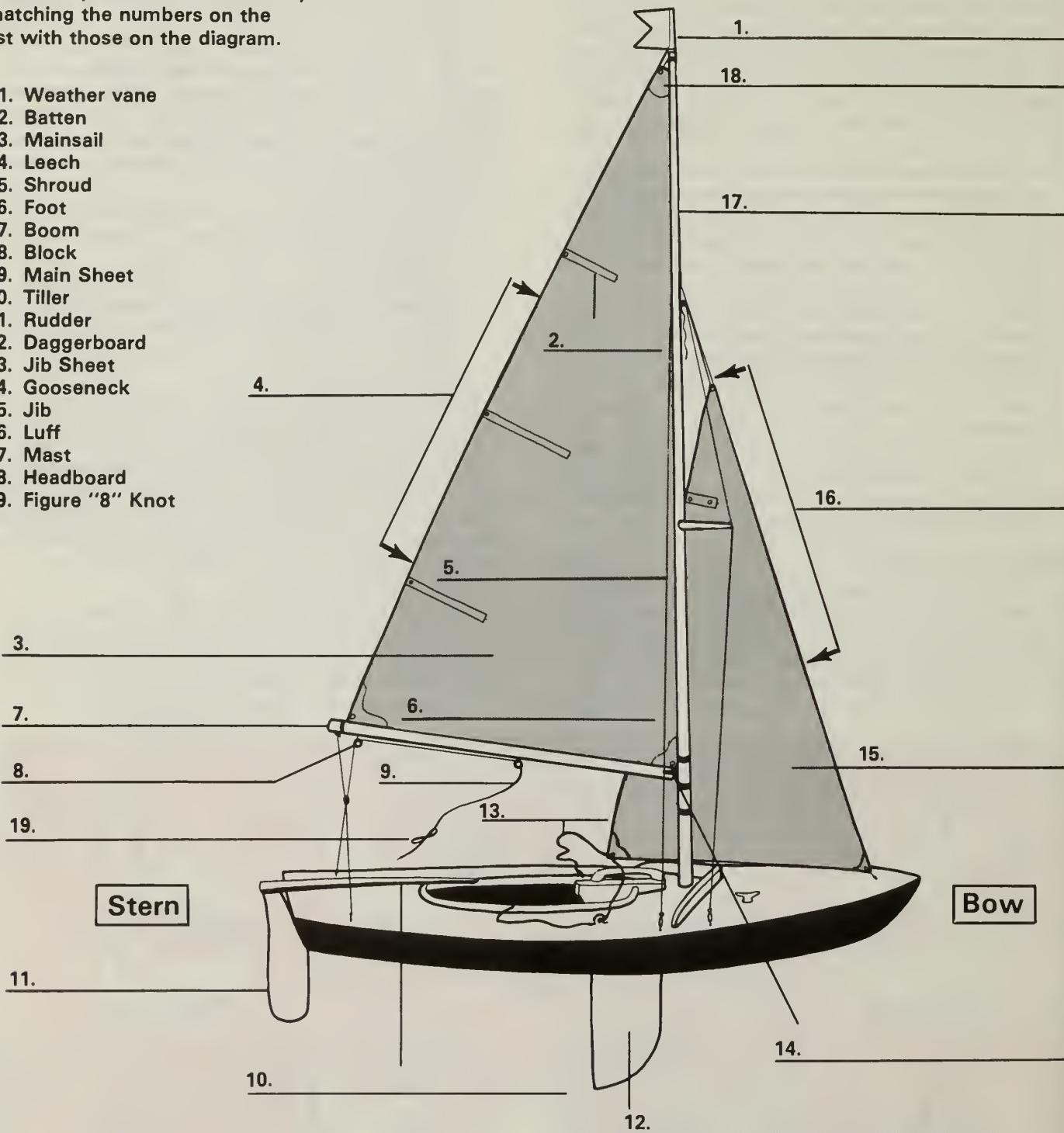




# SKIPPER'S SCORE

Label the parts of this sailboat by matching the numbers on the list with those on the diagram.

1. Weather vane
2. Batten
3. Mainsail
4. Leech
5. Shroud
6. Foot
7. Boom
8. Block
9. Main Sheet
10. Tiller
11. Rudder
12. Daggerboard
13. Jib Sheet
14. Gooseneck
15. Jib
16. Luff
17. Mast
18. Headboard
19. Figure "8" Knot





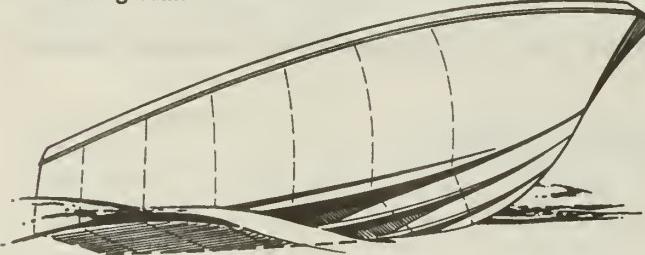
# **SKIPPER'S SCORE**

1. Many recreational motorboats are \_\_\_\_\_. They are ideal for water skiing, fishing and cruising.
2. \_\_\_\_\_ are most often double-ended, usually "people powered," but can be equipped with small, low horsepower motors.
3. A \_\_\_\_\_ is a motorboat with overnight accommodations.
4. The two basic types of cruisers are \_\_\_\_\_ and \_\_\_\_\_.
5. Day cruisers are small \_\_\_\_\_.
6. A \_\_\_\_\_ has a closed deck with a cockpit area for one or two people.
7. Why should an inflatable have several air compartments? \_\_\_\_\_  
\_\_\_\_\_
8. Why do sailboats need stabilizers? \_\_\_\_\_  
\_\_\_\_\_
9. Name two kinds of stabilizers used in sailboats. \_\_\_\_\_  
\_\_\_\_\_
10. Sailboats overtaking motorboats must yield the \_\_\_\_\_.
11. When a sailboat comes about, it \_\_\_\_\_.
12. When a sailboat turns its stern through the direction of the wind it is said to \_\_\_\_\_.
13. Motor boats should pass \_\_\_\_\_ of a sailboat.
14. A tiller is used to: (a) stabilize (b) steer (c) stop the boat.
15. Another word for sheets is (a) lines (b) sails.

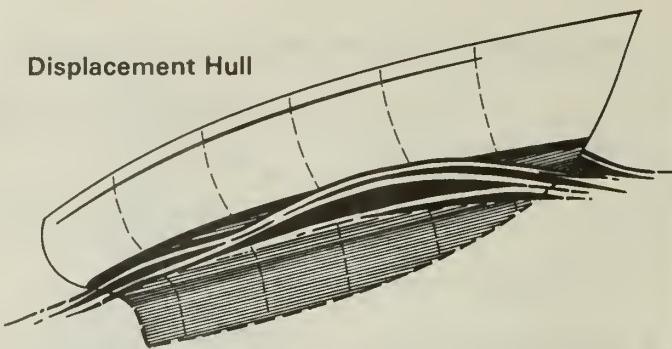


# Chapter 4 HULL DESIGN

Planing Hull



Displacement Hull



## Basic Boat Hulls

Boat hulls are either **displacement** or **planing**. Every boat that has ever been built has had one of these two types of hulls. A *planing* hull slides across the water at high speed. More power or a stronger wind makes it go even faster. A *displacement* hull plows through the water even when more wind or power is applied.

How a boat is to be used, and generally the speed at which it is to operate, determines the kind of hull that the boat should have.

Six common hull designs that may be either planing or displacement hulls are:

- |                 |              |
|-----------------|--------------|
| 1. Flat Bottom  | 4. Catamaran |
| 2. Round bottom | 5. Deep-V    |
| 3. V-bottom     | 6. Cathedral |

**Flat bottom**, square sided boats include home made utility boats, racing runabouts, some sailboats and houseboats. Flat bottoms plane easily.

**Round bottom** boats move easily at slow speeds. They have a great tendency to roll unless they have a large flat area near the stern. Canoes, tugboats, some fishing boats and sailboats have round bottoms and displacement hulls.

**Catamaran** hulls were probably first used for stability. Any kind of float or raft supported on two pointed logs uses the basic catamaran design. The twin hulled design can be either planing or displacement, depending on the shape of the two hulls used. In sailboats the twin hulls are normally

displacement, but in power boats they are usually planing type bottoms.

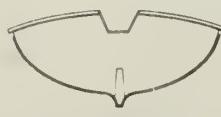
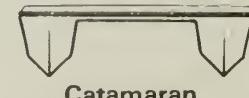
The **V-bottom** was an improvement over the flat bottom because it was more stable and rode better in rough water. It can be either a planing or displacement hull depending on the design.

The **Deep-V** is a hull with a sharp or deep-V bottom that has been promoted extensively in recent years. It planes well with a stern drive and offers a very comfortable ride in rough water.

**Cathedral** hulls are a combination of deep-V and catamaran. The twin "tunnels" along each side of the main hull trap spray and water to cushion the ride as well as to hold down spray when planing through waves. The cathedral hull design is popular on many fiberglass lines of boats.

## Flotation

Boats less than 20 feet in length are required by law to have buoyant material built into the hull to provide "basic flotation." Basic flotation means that a boat will not sink when filled with water and passengers are clinging to it. The flotation material must withstand the effects of contact with fuels and oil and exposure to sunlight, vibration and shock. An airtight chamber built into the hull does not qualify as buoyant material. The law also says "people powered" boats and boats with outboard motors less than two horsepower must be able to float in a level position when swamped. Buoyant material is required in certain areas around the boat to insure level flotation.

Flat Bottom  
(Planing)Round Bottom  
(Displacement)Cathedral  
(Planing)V-Bottom  
(Planing)Deep V-Bottom  
(Planing)Catamaran  
(Displacement/Planing)



# Chapter 5 REGISTRATION

## Registration and Identification Number

All vessels propelled by machinery (electric, gasoline, etc.) must be registered and numbered by the Division of Marine and Recreational Vehicles. Sailboats without power are exempt from registration.

Motorboat owners are responsible for registration with the Division every two years.

## Registration Procedures

- To register a vessel, boat owners must obtain an "Application for Certificate of Number" from the Division (see form pictured below).
- Complete and sign the application.
- File the application accompanied by the fee with the Division. Fees are \$20 for an original registration, \$20 for a renewal, \$1.50 for a transfer and \$1.00 for a replacement.
- The Division will return the stub portion of the registration application form to the owner. This pocket-sized Certificate of Number is to be carried in the boat or with the operator of the vessel during all times of operation.

## Renewal of Registration

The Certificate of Number is valid for two years from date of issue. Application for renewal must be made by the owner within 90 days before the Certificate expires. Renewals are made in the same manner as the original application.

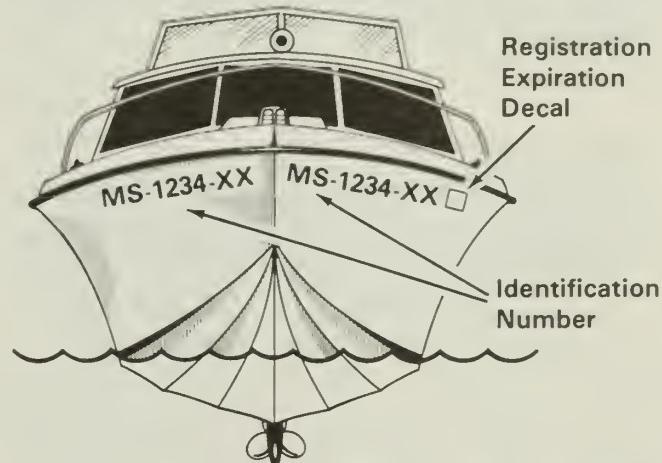
## Change of Name or Address

The owner of a vessel registered with the Division must notify the Division in writing within 15 days if he moves from the address shown on the Certificate of Number. The same applies to change of name through marriage or otherwise. In both situations notification

must include both old and new address or name and expiration date of the Certificate.

## Transfer of Ownership

The owner of a numbered vessel must report within 15 days to the Division any changes of ownership, transfers, destruction or abandonment of the vessel. The owner must return the Certificate of Number to the Division at the same time.



Back

INSTRUCTIONS FOR PREPARATION OF THIS FORM					
PRINT IN OR USE TYPEWRITER					
1. THIS FORM IS FOR THE USE OF OWNERS OF NUMBERED VESSELS. IT IS VALID FOR TWO YEARS FROM THE DATE OF ISSUE. A GENERAL CERTIFICATE OF NUMBER IS VALID FOR TWO (2) YEARS FROM THE DATE OF EXPIRATION FOR TRANSFERS AND FOR ABANDONMENT.					
2. THIS CERTIFICATE OF NUMBER IS NON NEGOTIABLE. TWO COPIES OF THIS NUMBER MUST BE MAILED TO THE DIVISION OF MARINE AND RECREATIONAL VEHICLES.					
3. IF YOU ARE GOING TO SELL YOUR VESSEL, YOU MUST FILE A NEW APPLICATION WITH THE DIVISION. THIS WILL REQUIRE A NEW CERTIFICATE OF NUMBER, AN INITIAL FEE OF \$20.00, AND THE ASSIGNMENT OF A NEW NUMBER.					
4. PLEASE CHANGE ANY INCORRECT INFORMATION ON THE OPPOSITE SIDE OF THIS FORM.					
NOTICE TO OWNER I HEREBY STATE THAT I HAVE READ AND UNDERSTOOD THE ABOVE INFORMATION. I AGREE TO FOLLOW THE RULES AND REGULATIONS OF THE MASSACHUSETTS DIVISION OF MARINE AND RECREATIONAL VEHICLES AS THEY MAY BE MADE, AMENDED, OR REPEALED. I HEREBY AGREE TO PAY ALL FEES AS PROVIDED IN THE RULES AND REGULATIONS OF THE MASSACHUSETTS DIVISION OF MARINE AND RECREATIONAL VEHICLES.					
5. CERTIFICATE OF NUMBER A. ALL INFORMATION CONTAINED IN THIS CERTIFICATE OF NUMBER IS FOR THE USE OF THE OWNER ONLY. B. NO COPIES OF THIS CERTIFICATE OF NUMBER ARE TO BE MADE. C. REPORT OF ACCIDENT FORMS ARE TO BE FILLED OUT BY THE OWNER OF THE VESSEL. D. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF OWNERSHIP. E. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF INSURANCE. F. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF REGISTRATION. G. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF TAX STATUS. H. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S VALUE. I. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S AGE. J. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S CONDITION. K. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. L. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. M. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. N. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. O. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. P. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. Q. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. R. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. S. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. T. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. U. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. V. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. W. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. X. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. Y. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY. Z. THIS CERTIFICATE OF NUMBER IS NOT TO BE USED AS A PROOF OF VESSEL'S MERCHANTABILITY.					

## Application for Certificate of Number

APPLICATION FOR CERTIFICATE OF NUMBER					
SHADED AREAS FOR DIVISION USE ONLY					
NUMBER ASSIGNED		PASSED BY	20	FINANCIAL NUMBER	11 17 85
		<input type="checkbox"/> ORIGINAL	<input checked="" type="checkbox"/> RENEWAL	<input type="checkbox"/> TRANSFER	<input type="checkbox"/> REPLACEMENT
INSTRUCTIONS FOR PREPARATION ON REVERSE SIDE					
YEAR	MANUFACTURER	USA	NAME	DOE, JOHN	L.
1982	NU-BOAT	WHERE BUILT	LAST	M.I.	
8469112	MULL IDENT. NO. (H. L. N.)	18'	ADDRESS	123 FOURTH STREET	STREET
4	COLOR	TYPE	CITY/TOWN	MA.	STATE
7			BOSTON	02202	ZIP
1			STATE		
1			ZIP		
M USE CODES ON BACK		NU-MOTOR	CO-OWNER	DATE OF BIRTH	
		ENGINE MANUFACTURER	NONE	CITIZENSHIP	
		F129	LAST	D.O.B.	
		ENGINE SERIAL NUMBER	FIRST	1982	
35		35	M.I.	NU-BOAT	
HORSEPOWER		FUEL		18'	
NONE		PROP		MFG'R'S NAME	
NONE		POLLUT		7	
8/5/82		DATE PUR.		4	
PREVIOUS OWNER				COLOR / HULL	
CITY/TOWN OF STORAGE OR MOORING AS OF JULY 18					
SIGNATURE					
I (WE) DECLARE TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT I (WE) OWN THE VEHICLE/VESSEL DESCRIBED HEREIN AND THAT THE DESCRIPTION AND ALL MATTERS STATED HEREIN ARE TRUE AND CORRECT					

Front



# REGISTRATION

## Identification Number Attachment Procedure

The owner is responsible for painting or attaching the number issued to each side of the bow on the forward half of the vessel. Numbers read from left to right in block characters of good proportion. They have to be a minimum of three inches in height, excluding border or trim, and a contrasting color to the boat's hull. The number must be clearly visible and legible at all times. No other numbers may be displayed on the bow of the vessel.

## Numbering Pattern To Use

The identification number consists of three parts:

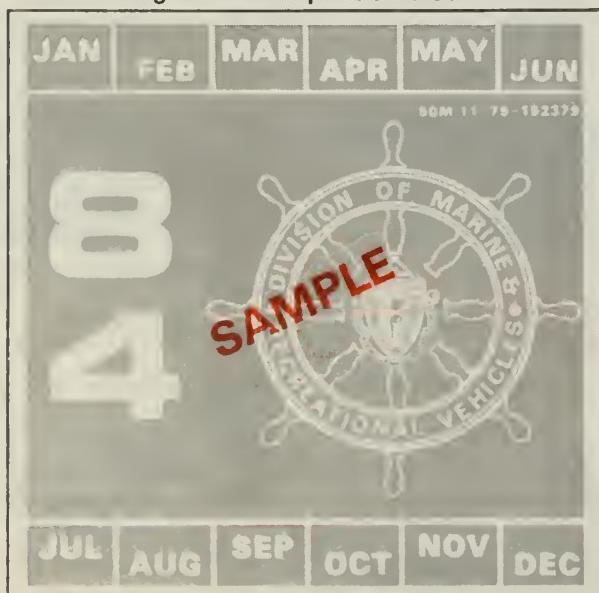
1. The letters "MS" indicating Massachusetts.
2. Not more than four (4) Arabic numerals.
3. Not more than (2) letters.

For example: MS 1234 AA    MS-1234-AB  
                   MS 123 AA    MS-123-AB

## Registration Expiration Decal

The Division of Marine and Recreational Vehicles also issues a Registration Expiration Decal with the identification number. It must be attached to the port side of the bow, aft of the identification numbers.

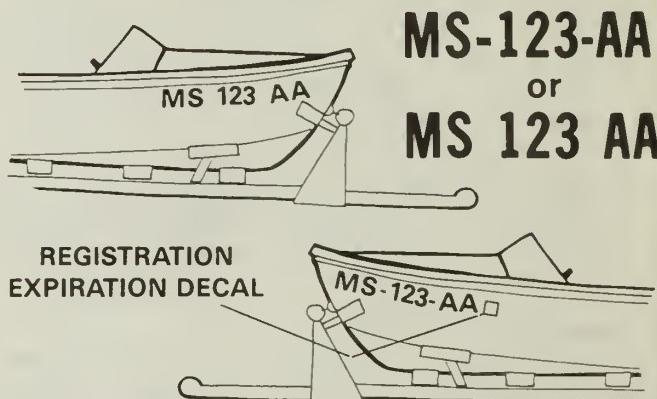
Registration Expiration Decal



## Numbers for Boat Manufacturers and Dealers

The Division of Marine and Recreational Vehicles issues a certificate to dealers and manufacturers which may be used on demonstrators and experimental craft. The certificate may be transferred among these vessels as need permits.

## Correct Display of the Number



## Boats Exempt from Registration

A vessel does not require registration if it is:

1. Covered by a number awarded by Federal law or federally-approved numbering system. This vessel must not have been in Massachusetts for a period in excess of 60 days in one calendar year.
2. A foreign vessel temporarily using the navigable waters of the United States and Massachusetts.
3. A public vessel of the United States, a state or subdivision of a state.
4. A vessel which has a valid marine document.
5. A ship's lifeboat.

## Operation in New Hampshire

Boats registered and numbered in Massachusetts are not allowed to operate on New Hampshire state waters without other numbering.

## Operation of Unnumbered Motorboats

No person shall operate, maintain or give permission for the operation or maintenance of any vessels which have not been numbered according to the Division of Marine and Recreational Vehicles.



# Chapter 6 TRAILERING

Boat owners who use trailers on Massachusetts highways should first check the laws of the state in regard to speed limits and load restrictions.

For further information, check with the Registry of Motor Vehicles, 100 Nashua Street, Boston, Mass.

All trailers should be equipped with basic safety equipment. When pulling a trailer, remember these safety checks:

- 1. Lights
- 2. Hitch
- 3. Mirrors
- 4. Brakes
- 5. Tire Pressure
- 6. Wheel Bearings
- 7. Safety Chains

The trailer is one of the most important items in the complete boating rig. If the choice is a poor one, the trailer will limit the boat's use, become a traffic hazard and cause serious accidents.

A trailer is the boat's home away from home. While no trailer will support the boat as well as water, there are several important considerations to help protect the boat while on the trailer.

## Bottom Support

The trailer must give the safest and strongest support with rollers and pads. Not enough support from the trailer may cause the boat's keel to break or its bottom to warp.

Tilt bed trailers are easy to handle if well engineered and adjusted to the boat. This eliminates the pushing, pulling or submerging often required at poor launching sites. If the bow is raised high enough, the weight of the boat will slide or roll it into the water. To retrieve the boat, use an electric winch (crank) or hand winch.

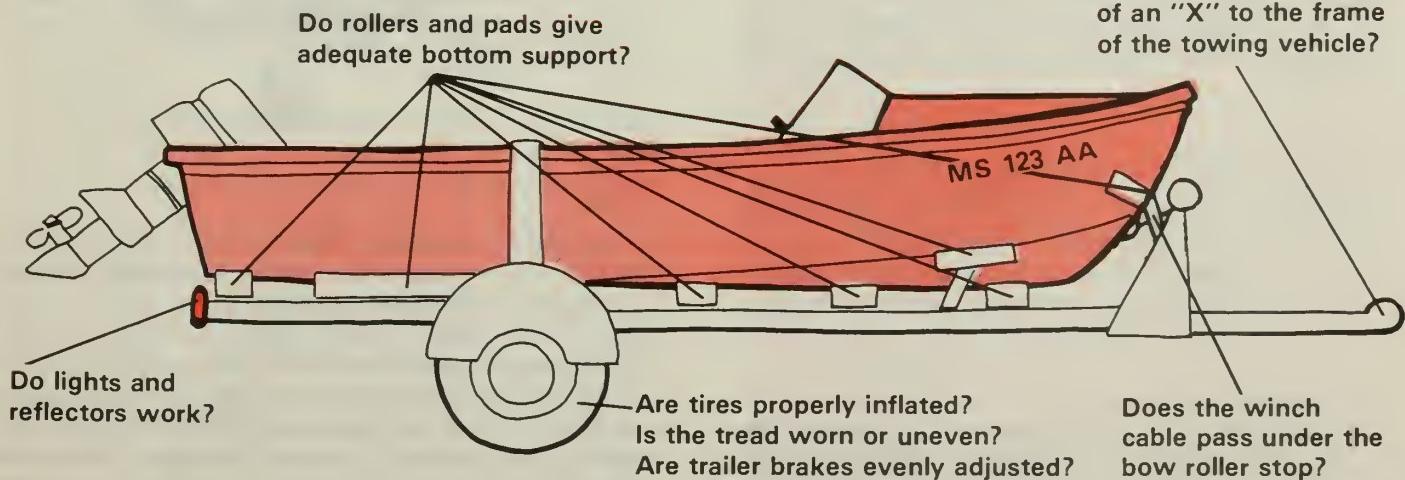
## Trailer Load

The trailer cradle must be strong enough to support several hundred pounds more than required. The trailer must be able to support and carry the boat safely at highway speeds. It should be able to withstand bouncing over rough roads.

Know how much weight the trailer can safely carry without becoming overloaded. Light items, such as sleeping bags, may be carried in the boat. It is important to store heavy canned goods, spare motor and camping equipment in the trunk of the car.

## Trailer Safety Checklist

**Student Activity:** Watch for vehicles towing boats.  
Are your state laws being followed?

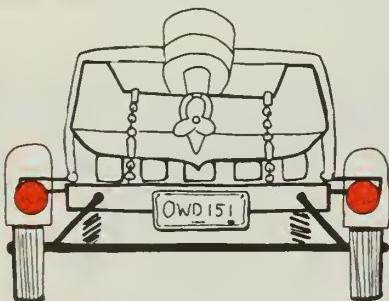




# TRAILERING

To help determine load weight, you should know that gasoline averages 6.6 pounds per gallon.

- Six-gallon tanks weigh 3 pounds empty and about 43 pounds full.
- Twenty-five gallon built-in tanks weigh 20 pounds empty and about 185 pounds full.
- Rainwater in your boat can overload the trailer. Since water weighs over 60 pounds per cubic foot, always leave the transom drain plug out when the boat is on the trailer.



## Hitch and Drawbar

Firmly attach the trailer hitch and drawbar to the frame of the car and not to the bumper. Regulation hitches are available for almost every make and model of car. Get the one that fits and make sure it is heavy enough for the boat you will be pulling.

A hitch attached to the front of the vehicle can aid launching or loading. Auto lights give plenty of light for nighttime trailer handling. The driver has full visibility and knows when to apply power or brakes.

A front hitch is also useful during the day on a tight or winding ramp. The front hitch prevents the auto exhaust pipe from submerging during launching or loading.

## Tongue Weight

Without sufficient tongue weight, an upward jolt tends to lift the trailer coupling off the ball of the hitch. Moreover, the trailer may begin to sway dangerously. About 10% of the total trailer weight should be on the tongue. This can be checked by placing the tongue on a bathroom scale.

## Couplings

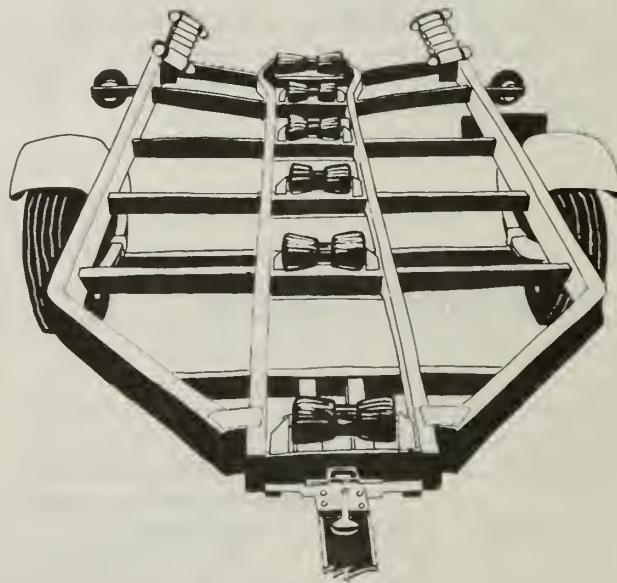
Check frequently! Screw types work loose. The wedge-action coupler is simpler and more effective. Be sure it is lubricated to prevent corrosion. Don't leave the padlock key at home!

## Safety Chains

Safety chains prevent the trailer tongue from dropping to the ground if the hitch fails. They should be strong enough to control the trailer if the regular hitch or coupling breaks. Hook the chains in the form of an "X" to the frame of the towing vehicle. Use a bolt to secure the safety chains to the tongue.

## Wheel Bearings

Wheel bearings should be greased at least once a year at the end of the boating season, more often if the wheels on the trailer are being submerged when launching the boat. A good check when in doubt is to pull the trailer a mile or less and get out and feel the hubs on the wheels. If there is any sign of heat the bearings need grease immediately. A trailer that is properly rigged should unload a boat without dunking the wheels unless the launching site is especially shallow.



## Tires

Don't buy a trailer without checking its capacity against the weight of the boat, motor, fuel and equipment that it will have to carry. Be especially careful about the size and rating of the tires. The larger the wheels and tires the better for your boat because the larger tires will not bounce into and out of small holes or mire down in soft ground. Trailer tires the same size as used on the towing vehicle solve the problem of having a spare if a flat tire occurs. Also, larger tires wear longer.



# TRAILERING

Good care of trailer tires prolongs their life. Pay special attention to the following:

- Check Tire Pressure** and adjust to manufacturer's specifications.
- Lug Bolts.** A loose wheel may cause tire wear and perhaps a serious accident.
- Tire Rotation.** Uneven tread wear can cause weaving, flat spots and blow-outs. Rotate tires at least once every boating season.
- Boat Storage.** Place blocks under the axle and remove weight from tires. This helps prevent flat spots and tire rot.
- Trailer Brakes.** Keep trailer brakes adjusted evenly. A sliding wheel causes tire wear. The boat should stop straight behind the auto to avoid a serious accident.

There are more and more trailerable boats on the highways. The trailer is a lifeline between fun and disaster. A poorly equipped trailer can easily turn a fun-filled weekend into one that will cause a lifetime of sorrow.

## Trailer Towing Tricks

The car used for towing must be up to the job of towing a boat and trailer. A passenger car in good condition can safely tow a loaded trailer equal to 40 percent of the car's weight. A special factory-installed towing package is advisable for long distance towing of heavy trailers.

**Engine Overheating**—Stop in a safe spot off the highway. Set the brakes and move the shift lever to neutral or park. Raise the hood, but don't try to remove the radiator cap. Idle the engine rapidly to increase air flow. If the car is air-conditioned, shut the air-conditioner off until fast idling returns the temperature to normal. (Never pour cold water on a hot engine.)

**Corners and Curves**—Trailer wheels do not follow the path of the car wheels. Steer wider on corners and the trailer will clear the curb and other vehicles. Stay well on your side of the center line on curves.

**Passing**—Remember, the trailer adds weight and reduces acceleration. More overtaking room is needed. Don't cut-in too soon after passing. Change lanes smoothly to avoid whipping the trailer.

**Being passed**—Air turbulence from a large truck or bus will push the trailer to the right. But the gust will move along the trailer immediately and tend to correct the sway. Don't brake. If you cannot travel at the average speed of other traffic on the highway, pull over to allow faster-moving traffic to pass you.

**Stopping**—Avoid situations that require a sudden stop. Allow extra following distance.

**Backing**—This isn't easy and it is always hazardous. Move the bottom of the steering wheel in the direction you want the trailer to go. Before backing, make certain that no one is behind you. It's best to have someone guide you while backing.

**CAUTION**—If trailering a sailboat with the mast in place, be sure there are no low-hanging electrical wires nearby!

## Ramp Etiquette

Launching a boat can sometimes be a problem. Wind, a slippery boat ramp or other local problems may mean hidden hazards. The boat owner can make the task easier by being alert and following this simple procedure. Remember, courtesy and efficiency will go a long way in making a boat trip a pleasure for you and others too.

Before you get in line, do the following:

- Stay to one side and watch one or two launches to notice any problems on the ramp and the effects of wind and current on launching.
- Remove any gear that is stored in the car. Rig boat, step mast, etc.
- Disconnect the wiring plug between car and trailer.
- Remove tie-downs. Double check to make sure that the drain plug is in.
- Attach a line to a bow cleat and a second line to a stern cleat to aid in controlling the boat after launching.
- Double check engine safety chains and make sure that the outboard is securely attached to the transom.

Enter the launching line:

- Back down into the water until the rear rollers are barely under the water.
- Have someone guide you into the water and hold onto the guide lines which you connected.
- Disconnect the winch line from the bow eye and put the boat in the water.
- Move your boat so others may launch.
- Return your vehicle and trailer to the parking area.



# **SKIPPER'S SCORE**

1. Trailer wheel bearings should be greased at least once each\_\_\_\_\_.
2. Trailers are designed to give support to the boat's: (a) rigging (b) cockpit (c) bottom.
3. Light items, such as sleeping bags, may be carried\_\_\_\_\_when trailering.
4. Heavy items must be stored\_\_\_\_\_when trailering.
5. Gasoline weighs\_\_\_\_\_pounds per gallon.
6. A trailer hitch should be attached to the car's: (a) frame (b) bumper.
7. Why should you have a safety chain on your trailer hitch?  
\_\_\_\_\_  
\_\_\_\_\_
8. A boat trailer rides better on (a) large (b) small tires.
9. Having the same size tires on a trailer as the tow car solves the problem of having a\_\_\_\_\_.
10. Name two ways you can make your trailer tires last longer  
\_\_\_\_\_  
\_\_\_\_\_
11. A car used for towing can safely tow a boat and trailer equal to\_\_\_\_\_of the weight of the car.
12. Because trailer wheels do not follow the path of car wheels you must steer\_\_\_\_\_on corners.
13. When towing a trailer you need more room to pass other cars because\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
14. When towing a trailer you should avoid stopping\_\_\_\_\_and be sure to keep plenty of\_\_\_\_\_between you and the car ahead.
15. What should you do if your car engine overheats while you are towing a boat?  
\_\_\_\_\_



## EQUIPMENT



### VII. Chapter 7—Motors

- A. Outboards
  - 1. Outboard capacity plate
- B. Inboard
  - 1. Inboard-Outdrive . . . Sterndrive
  - 2. Diesel
  - 3. Cooling

### VIII. Chapter 8—A Safe Boat

- A. Fire extinguishers
- B. Mufflers
- C. Carburetor backfire flame arrestor
- D. Ventilation
- E. Whistles and horns
- F. Bells

### G. Illegal equipment

- H. Maneuvering Signals
- I. Lighting requirements
  - 1. Inland
  - 2. International

### IX. Chapter 9—Life Saving

- A. Personal flotation devices
  - 1. Life preservers—Type I
  - 2. Buoyant vests—Type II
  - 3. Special purpose devices—Type III
  - 4. Throwaway devices—Type IV
  - 5. Restricted special purpose devices—Type V
- B. Checking your PFD
- C. PFD regulations



# A SKIPPER'S TALE

## A PFD for Me

Paula and Sally had started the barbecue at the end of the dock and were carefully turning the franks as they waited for the rest of their gang to arrive.

Fires along the beach were proof that although it was beginning to grow dark many boaters were extending their fun outdoors as long as possible.

Children were playing on the beach and with the wind rising steadily the bay now had a chop that turned an occasional white cap and broke a light spray across the dock. The girls were on a floating dock, which was constructed of several sections of planking supported by fiberglass floats. The entire structure was somewhat loosely joined to keep the waves from breaking the dock as it was forced up and down by the moving water.

Looking up from the grill, Sally noticed three small children running down the dock toward them, skipping and jumping from one section of the walkway to another. Two of them were wearing bright orange life jackets but the one in the middle

**Student Activity:** Which requirements apply to your boat?

wore only a light colored swim suit. Then it happened.

One child stumbled, there was a splash and several short screams as one small figure fled to shore and the other one stood paralyzed in a half crouch.

Sally almost tripped over the grill as she leaped to her feet and raced to the place where one of the children had disappeared. When she got there, a soaking wet head and a big toothless grin greeted her.

The one that went in was wearing a life jacket, a PFD in today's boating language, and he simply floated up from between the bouncing dock sections.

Sally jerked him up onto the float and it was over. A skinned shin and an undampened attitude were the only results. Not only had the PFD prevented a possible drowning had the child come up under the dock, but the same device padded his fall.

One advantage often overlooked by the person who can swim well is the fact that wearing a PFD may make it easier to rescue another person. Any skipper may need this extra advantage to help save a person who has fallen overboard.

## U.S. Coast Guard Minimum Equipment Requirements for Motorboats

EQUIPMENT	CLASS A (less than 16 ft.) (less than 4.9m)	CLASS 1 (16 to less than 26 ft.) (4.9 to less than 7.9m)	CLASS 2 (26 to less than 40 ft.) (7.9 to less than 12.2m)	CLASS 3 (40 to not more than 65 ft.) (12.2 to not more than 19.8m)
BACK-FIRE FLAME ARRESTOR	One approved device on each carburetor of all gasoline engines installed after April 25, 1940, except outboard motors.			
VENTILATION <small>Boats built before August 1, 1980.</small>	At least two ventilator ducts fitted with cowls or their equivalent for the purpose of properly and efficiently ventilating the bilges of every closed engine and fuel-tank compartment of boats constructed or decked over after April 25, 1940, using gasoline as fuel or other fuels having a flash-point of 110° or less.			
Boats built on August 1, 1980, or later.	At least two ventilator ducts fitted with cowls or their equivalent for the purpose of efficiently ventilating every closed compartment that contains a gasoline engine having a cranking motor and every closed compartment containing a gasoline tank, except those having permanently installed tanks which vent outside the boat and which contain no unprotected electrical devices. Also, engine compartments must contain power operated exhaust blowers which can be controlled from the instrument panel.			
PERSONAL FLOTATION DEVICES (PFD's)	One approved Type I, II, III or IV PFD for each person on board or being towed on water skis, etc.	One approved Type I, II or III device aboard for each person on board or being towed on water skis, etc.; and, in addition, one throwable Type IV device.		
BELL, WHISTLE	All boats must be able to produce navigational signals under rules of the road.	Whistle—one hand, mouth, or power operated, audible at least $\frac{1}{2}$ mile.	Bell—one, which when struck, produces a clear, bell-like tone of full round characteristics.	One hand or power operated, audible at least 1 mile.
VISUAL DISTRESS SIGNALS <small>(Required on coastal waters only; see Chap. 20)</small>	Only required at night. Must carry three visual distress signals approved for nighttime use.	Must carry three visual distress signals approved for daytime use and three approved for use at night. Three combination day/night signals may be substituted. NOTE: All boats carrying six or more passengers for hire must meet these requirements also.		One power operated, audible at least 1 mile.
FIRE EXTINGUISHER-PORTABLE <small>When NO FIXED fire extinguishing system is installed in machinery space(s).</small>	At least one B-I type approved hand portable fire extinguisher. (Not required on outboard motorboats less than 26 feet in length and not carrying passengers for hire if the construction of such motorboats will not permit the entrapment of explosive or flammable gases or vapors and if fuel tanks are not permanently installed.)	At least two B-I type approved portable fire extinguishers; OR at least one B-II type approved portable fire extinguisher.	At least three B-I type approved portable fire extinguishers; OR at least one B-I type plus one B-II type approved portable fire extinguisher.	
When FIXED fire extinguishing system is installed in machinery space(s).	None.	None.	At least one B-I type approved portable fire extinguisher.	At least two B-I type approved portable fire extinguishers; OR at least one B-II type approved portable fire extinguisher.

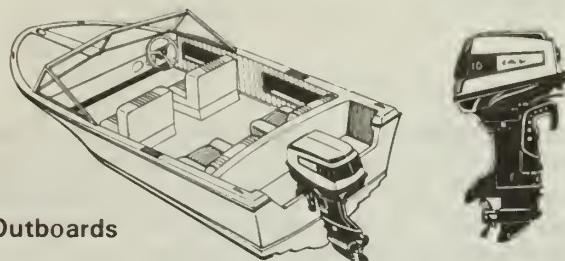


# Chapter 7 MOTORS

## Outboards

Outboard motors power more boats than all other kinds of motors. An outboard is a complete power unit for a boat. It is made up of an engine and a drive shaft connected to a propeller, all contained in a single unit that can be attached to a boat.

An outboard is usually clamped to the *transom*; however, it can also be installed in a *well* inside the boat, to the side of the boat on a bracket, or on the bow as with small electric motors.



Outboards

Outboards run on either electricity or gasoline. Electric models are small and run on batteries. Limited in travel range, they are generally used for fishing or moving about in quiet waters.

Gasoline outboards range in size from single-horsepower models weighing 15 pounds, to 150 horsepower industrial or racing models weighing 300 pounds.

Small models sometimes have built-in fuel tanks while larger ones (5 horsepower and up) have separate tanks that may either be portable or built into the boat. A mechanic's advice on the installation of fuel tanks can also make a big difference in your boat's performance.

Almost all outboards are two-cycle models that require gasoline mixed with small amounts of oil. The mixture provides fuel for the engine while it lubricates the bearings and helps to cool the engine's internal parts.

Modern outboard motors usually require one pint of oil to six gallons of gasoline. Since this is much less than the amount used in older models, smoking outboards have become almost extinct.

Four-cycle outboards are heavier and more expensive than two-cycle models, but they burn less gas and are very reliable.

The right sized propeller is extremely important to an outboard motor. If the propeller is too large, the motor will not turn up to its most efficient speed. If it is too small, the engine will run too fast, wasting fuel and interfering with performance.

Because individual boats differ, you should have an experienced mechanic help you choose the right combination of motor and propeller for your boat.

Learn something about your outboard. Know how to lubricate it properly and how to perform simple jobs like changing the spark plugs, sediment bulb or fuel filter. These and other simple repair jobs can save you money and time. Knowing how to check a water pump can keep you from ruining a motor or having to call for help.

An outboard boat will change character quickly if one outboard motor is removed and another clamped into place. A 12-foot boat with a 5 horsepower motor is a pleasant fishing or utility boat with a limited range. The same boat, equipped with a 50 horsepower outboard and pushed to speeds it wasn't designed for, is a great danger.

Overpowering has caused many accidents and loss of lives. Matching an outboard motor to a boat must be done carefully. Pick the right boat for your needs, then select a motor to give it proper performance. The boat manufacturer will supply horsepower information and any reputable dealer can supply and install the right outboard.



Outboard Capacity Plate

The boat manufacturer will install a capacity plate. The capacity plate is placed inside the boat in full view of the operator's station. It gives the maximum load and horsepower rating. It is mandatory on new boats and can be helpful in matching a motor to a boat. If your boat is home-built or doesn't have a capacity plate, use the safe loading formula found on page 53.

Don't forget the danger of gasoline. Its power makes boating possible. But that same power can kill. Wipe up all spilled fuel immediately. Keep all compartments closed when fueling. If tanks are portable, do not fill them in the boat. Set them out on the dock or ground. Gasoline and oil spills are messy, dirty and very dangerous.

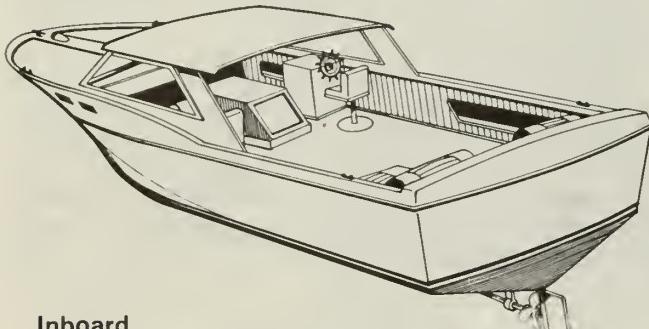


# MOTORS

## Inboards

The inboard motor that you see on a boat may be a converted truck, automobile or even lawnmower or motor scooter engine. Almost every motor made has been used in a boat at one time or another. Even airplane engines are used to power racing boats.

An inboard motor is housed within the hull of the boat. It is generally connected to a propeller shaft and the propeller is located under the boat's stern. Directly behind the propeller is a rudder, used to steer the boat.



**Inboard**

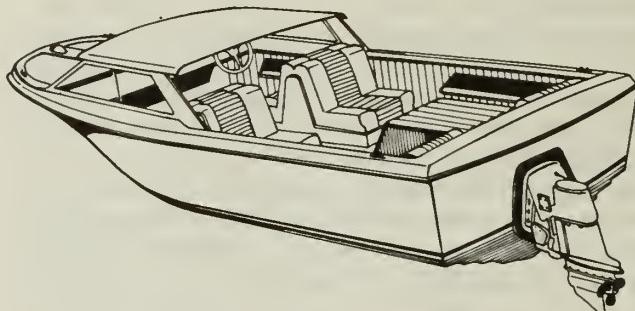
A transmission (gear box) allows power to be shifted from forward to reverse or neutral without stopping the engine. Without the transmission acting between the motor and the propeller, the boat would move as soon as the engine was started.

When the boat is moving forward and the transmission is shifted into reverse, the reverse power works like a brake. When the boat is backing up, shifting the gears into forward brakes the motion of the boat.

## Inboard-Outdrives . . . Sterndrives

Another type of inboard is the inboard-outdrive (I-O). It offers the fuel economy of an inboard and the flexibility of an outboard. The motor is mounted inside at the rear of the boat. Its drive shaft runs out the transom, through two sets of gears, down into the water, and backwards to a propeller.

The outdrive has a transmission with three gears—forward, reverse and neutral. As with an outboard, it can be raised, leaving no propeller or rudder below, so the boat can easily be beached or loaded onto a trailer.



**Inboard-Outdrive**

Inboard engines are either gasoline or diesel powered. Gasoline engines offer lighter weight and lower original cost, but, because they use gasoline, they are greater fire and explosion hazards. Engine size has nothing to do with the amount of danger. A half cup of gasoline spilled in the bottom of a boat can blow it apart. The fact that a gasoline engine also uses an electrical ignition system adds to the danger. Sparks from this or any electrical source can explode gasoline fumes from spilled fuel.

## Diesel Inboards

Diesel inboards are heavy and expensive, but they run with few repairs and they use small amounts of low-cost diesel fuel. Diesel fuel does not explode and is not easily set on fire. A diesel engine does not have an electrical ignition system. Compared to gasoline engines, diesels are noisy, but they are improving and even the unpleasant odor of diesel exhaust has been reduced.

## Cooling

Inboard motors are cooled by water in almost all cases. Water is pumped up from beneath the boat, circulated through the engine and emptied through exhaust pipes. Watch out for debris in the water. A plastic bag or other garbage can plug a water intake valve and overheat or damage the engine.

Some inboard engines, especially those used in really cold salt water, need fresh water cooling. These engines have water or antifreeze sealed into a cooling system just like an automobile except the boat "radiator" is called a heat exchanger. This is a tank that circulates water from beneath the boat and protects the engine against water that is too cold.



# Chapter 8 A SAFE BOAT

## Fire Extinguishers

Fire is one of the skipper's greatest fears. It causes more damage on boats than any other mishap. All boats should carry readily accessible fire extinguishers approved by the U.S. Coast Guard.

Fire extinguishers are classified by letters and numbers according to their size and the type fire they can put out. The letter indicates the type of fire: "A" for combustible solids like wood; "B" for flammable liquids; "C" for electrical fires and "D" for combustible metals like magnesium.

One of these materials can be used to put out fires on boats:

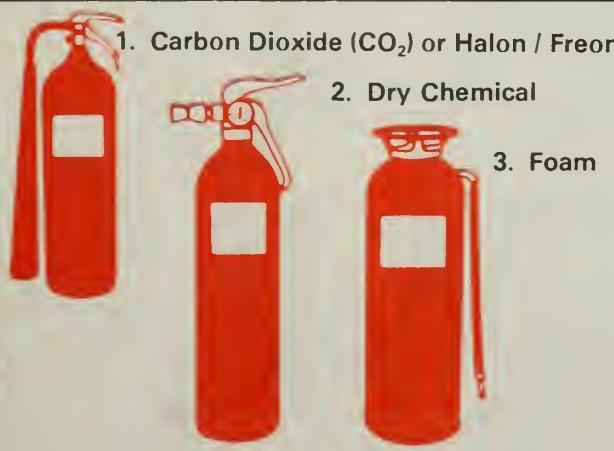
- |   |              |
|---|--------------|
| 1. Carbon Dioxide—CO <sub>2</sub> (A, B, C) | 4. Foam (B)  |
| 2. Halon/Freon (A, B, C)                    | 5. Water (A) |
| 3. Dry Chemical (B, C)                      |              |

Some boat fires involve burning wood and paper (Class A). These fires can be put out with water. But, do not use water on gasoline, oil, or electrical fires. Water will cause a gasoline or oil fire to spread.

Most boat fires consist of burning oil or gasoline (Class B). A Coast Guard approved marine fire extinguisher, as described in the chart below, will put them out very quickly.

## Marine Fire Extinguisher Classification

CLASSIFICATION (type-size)	FOAM (minimum gallons)	CARBON DIOXIDE (minimum pounds)	DRY CHEMICAL (minimum pounds)	HALON / FREON (minimum pounds)
B-I	1 1/4	5	2	2 1/2
B-II	2 1/2	15	10	10



Boat fires also may be caused by electrical wiring (Class C). The current overloads the wire, gets it hot, and sets the insulation on fire. An extinguisher must be able to put out this fire without giving the user a shock. Use dry chemical, CO<sub>2</sub>, or Halon / Freon.

Check frequently to be sure that fire extinguishers are properly stored and undamaged. Replace cracked or broken hoses. Keep nozzles free of obstructions. Check pressure gauges for proper pressure. Make sure that locking pins and sealing wires are in place.

Never try an extinguisher to see if it works properly. The valves may not reseal and a gradual discharge results. After using an extinguisher, recharge it as soon as possible and before using the boat again.

## Mufflers

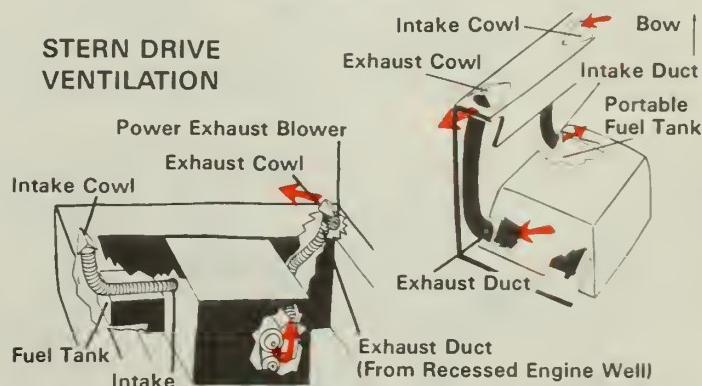
Noise from a poorly muffled or unmuffled motor disturbs others. More important, it can prevent the motorboat operator from hearing voices, signals or sounds warning of danger. Keep your muffler in good condition.

## Carburetor Backfire Flame Arrestors

Internal combustion engines may backfire. To safeguard against fire, all motorboats, except outboards and diesels, must have a Coast Guard approved *carburetor backfire flame arrestor* on each carburetor.

## Ventilation

Regulations require ventilation of all closed engine and fuel tank compartments if gasoline is used for fuel. The diagram below shows a typical system.

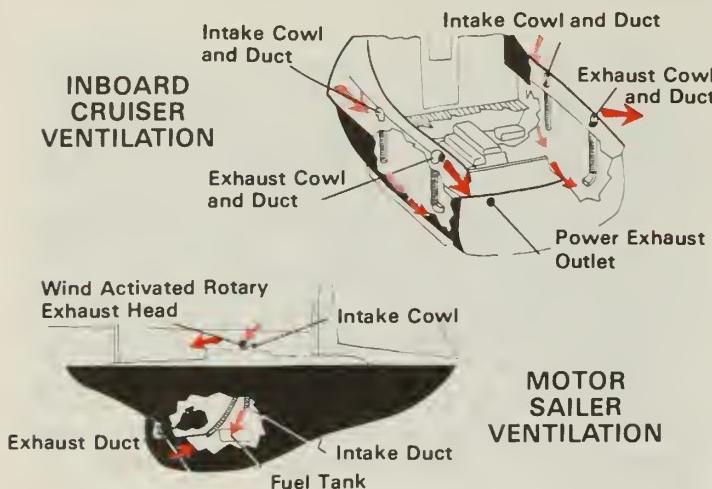


Ventilation ducts must be at least two inches in diameter. Intake ducting must extend midway to the bilge, or at least below carburetor air intake level. Exhaust ducting must extend from the lower bilge to *cows* in the open atmosphere.

Manufacturers install exhaust blowers in engine compartments so that gasoline fumes can be removed before engines are started. Some ventilation systems are shown on the next page.

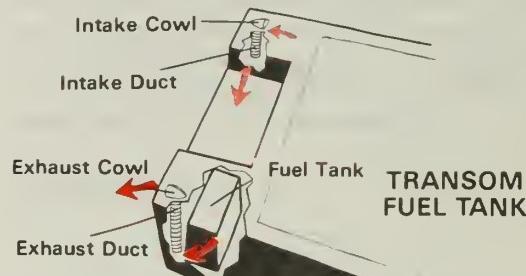


# A SAFE BOAT



Boats built after July 31, 1980, which contain power exhaust blowers in gasoline engine compartments, must have the following warning sticker near the instrument panel:

**WARNING — GASOLINE VAPORS CAN EXPLODE.  
BEFORE STARTING ENGINE OPERATE BLOWER FOR  
4 MINUTES AND CHECK ENGINE COMPARTMENT  
FOR GASOLINE VAPORS.**



## Whistles and Horns

According to both Inland and International Rules, all boats less than 65 feet (19.8 meters) must carry some type of sound-producing equipment for signaling. Federal regulations specify what type is required (see equipment chart on page 26). Whistles and horns are commonly used and are most effective.

The rules of the road require boat operators to sound fog signals and maneuvering signals whenever necessary. When underway in the fog or heavy rain, fog signals help prevent collisions by alerting skippers to the presence of other boats that are not visible. And when boating in heavy traffic, maneuvering signals communicate intentions to change course.

Fog signals are shown on page 36. The basic maneuvering signals are shown below; be sure to read Chapter 14 to learn exactly how they're used.

Whistles can also be used to prevent collisions on sharp, blind curves in a river or creek. On approaching a blind curve, sound one prolonged (4-6 sec.) blast on the whistle. Any boat out of sight around the bend will respond with a similar blast. Both boats then proceed with caution until in sight of each other.

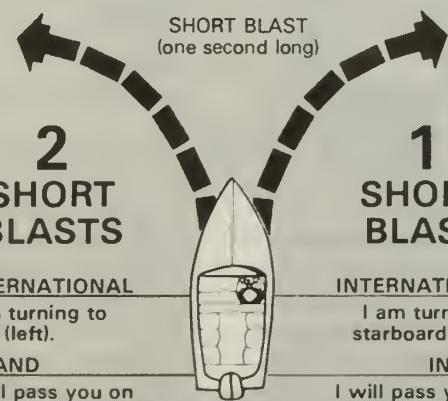
## Bells

Motorboats 26 feet (7.9 meters) and over must be equipped with a bell that gives a clear tone when struck, as well as a whistle. When at anchor during fog, mist, falling snow or heavy rainstorms, the boater must ring the bell rapidly for about five seconds at one minute intervals (see page 36). This must be done day or night.

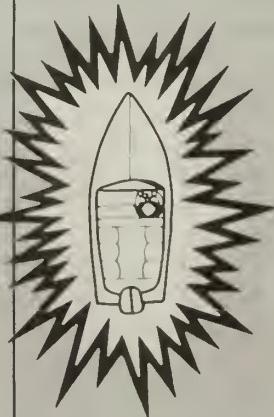
## Illegal Equipment

Law enforcement vessels are the only boats allowed to use blue flashing lights.

### Basic Maneuvering Signals To Prevent Collisions (Refer to Page 50).



**3  
SHORT  
BLASTS**  
INTERNATIONAL  
My engine is in REVERSE!



**5 OR  
MORE  
SHORT  
BLASTS**  
INTERNATIONAL  
DANGER!  
STAY AWAY!

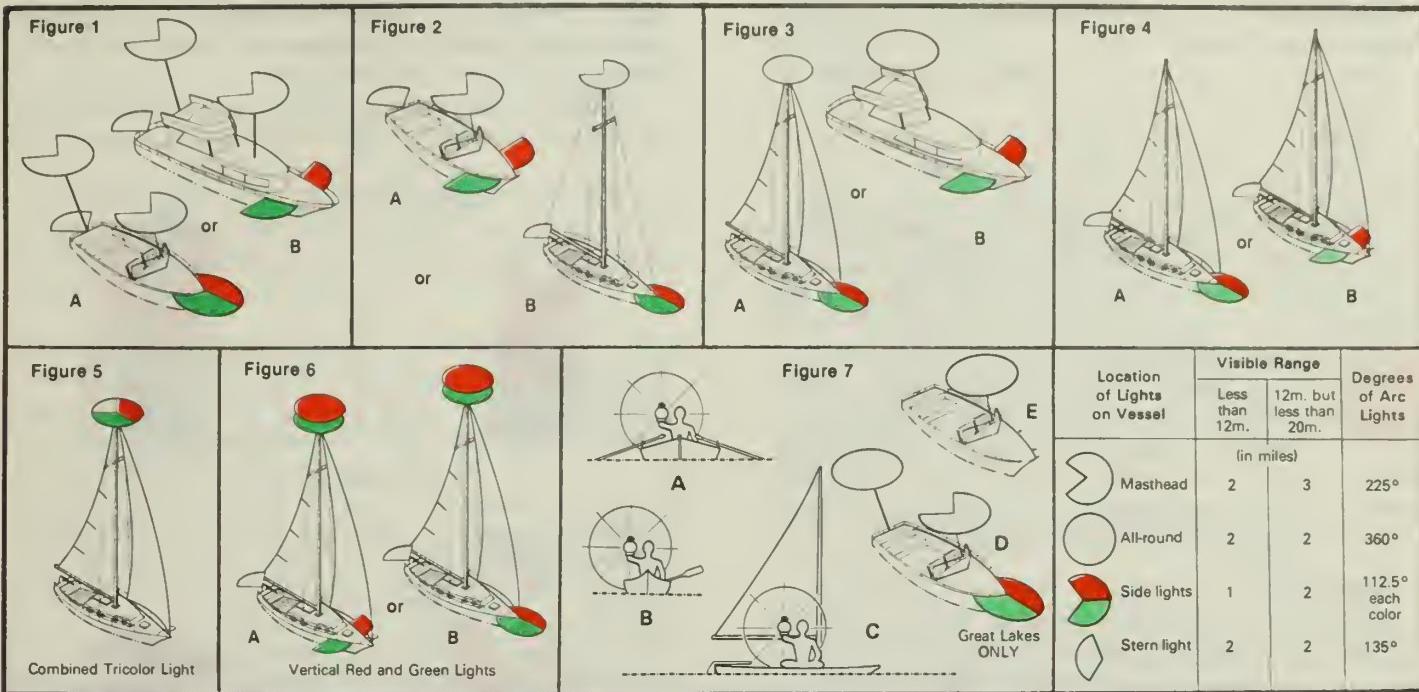


# A SAFE BOAT

## Lights

Any boat used between sunset and sunrise must show the lights required by law. Light placement and requirements vary with the size and class of boats as

the chart below shows. In general, the lights required for inland waters **cannot** be used on international waters. However, boats equipped with lights for international waters can be used on inland waters.



## Lights Required on Boats Between Sunset and Sunrise

X = A boat may show navigation lights as displayed in figure indicated.

■ = A boat built before December 24, 1981, may show lights as displayed in figure indicated.

● = A boat built on or after December 24, 1981, may show lights as displayed in figure indicated.

1 To be used to show one white light in time to prevent a collision.

2 Back masthead light must be higher than the forward masthead light.

3 Masthead light must be at least 2.5 meters (8'2") above the gunwale.

4 Masthead light must be at least 1 meter (3'3") higher than the side lights.

### CONVERSIONS:

1 meter = 3'3"

7 meters = 22'9"

12 meters = 39'5"

20 meters = 65'8"

		Powerboats or Sailboats Under Power			Sailboats Under Sail Alone								
INLAND Lighting Rules		Figure 1	Figure 2	Figure 3	Figure 4	Figure 5	Figure 6						
Less than 20 meters		■	■	■	X	X	X						
12 meters or more but less than 20 meters		● <sup>2,3</sup>	● <sup>3</sup>		X	X	X						
Less than 12 meters		● <sup>2,3</sup>	● <sup>4</sup>	●	X	X	X						
Less than 7 meters		● <sup>2,3</sup>	● <sup>4</sup>	●	If impractical to carry the stern and side lights recommended for other sailboats, the boat must have a flashlight or lantern on hand. <sup>1</sup> (Figure 7C)								
INTERNATIONAL Lighting Rules		Figure 1	Figure 2	Figure 3	Figure 4	Figure 5	Figure 6						
12 meters or more but less than 20 meters		X <sup>2,3</sup>	X <sup>3</sup>		X		X						
Less than 12 meters		X <sup>2,3</sup>	X <sup>4</sup>		X	X	X						
Less than 7 meters		If maximum speed does not exceed 7 knots, an all-around white light may be substituted for the required lights. (Figure 7E)			If impractical to display lights recommended for sailboats less than 12 meters, the boat must have a flashlight or lantern on hand. <sup>1</sup> (Figure 7C)								
INLAND AND INTERNATIONAL Lighting Rules													
a.	Inland Lighting Rules apply only to inland waters, Western Rivers and the Great Lakes. International Lighting Rules are required on the ocean and are in effect at the jetty or pierhead line of waters in coastal states called the <i>Line of Demarcation</i> . Boats equipped with lights for international waters can be used on inland waters.												
b.	Powerboats operating on the Great Lakes may carry an all-around white light instead of a masthead light and stern light. (Figure 7D)												
c.	Boats propelled by oars or paddles shall have a lantern or flashlight on hand to show one white light in time to prevent a collision. (Figures 7A & B)												
d.	Lights Used When Anchored — All vessels less than 20 meters in length must display one all-around white light when at anchor. Boats less than 7 meters are not required to display anchor lights unless anchored in or near a channel, at an anchorage or near other vessels.												



# Chapter 9 LIFE SAVING

## Personal Flotation Devices (PFDs)

Personal flotation devices are an important safety item and should be carried aboard all boats. PFDs, one for each passenger, are required on most boats. Regulations may differ in your state so be sure to check state requirements.

There are several types of PFDs; they include:

1. Type I Life Preservers
2. Type II Buoyant Vests
3. Type III Special Purpose Devices
4. Type IV Throwable Devices
5. Type V Restricted Special Purpose Devices

As a general rule, Type I PFDs should be used for oceans and exposed waters; Type II for lakes, rivers and protected waters; Type III for water sports; and Type IV for throwing to persons in the water.

PFDs are the boater's most important items. They should be treated with care and always be readily accessible. Children, non-swimmers, and handicapped people should always wear PFDs when in a boat. Smart skippers insure safety by adjusting PFDs to fit each passenger before leaving the dock.

### Life Preservers—Type I

Life preservers provide excellent flotation. They will last many years if given reasonable care. Always dry them completely before putting them away. Stow them in a dry, well-ventilated, easily accessible place. Airing and sun drying is the best. NEVER stow PFDs near oil or grease. During winter storage, remove them from the boat and stow them at home.

Type I PFDs may use kapok, fibrous glass and/or unicellular plastic foam for flotation. They are made in jacket or bib designs. Life preservers come in child and adult sizes and are marked as such. A snug fit is very important. All approved life preservers are international orange in color.

Type I PFDs contain at least 20 pounds of buoyancy. They are the least comfortable to wear, but the most effective for long exposure in rough water.

If life preservers become torn, stiff, or heavy, destroy them. Replace them immediately.

Even good swimmers can drown. The Type I life preserver is designed in such a way that, even if injured or unconscious, the wearer's face remains out of the water.

### Buoyant Vests—Type II

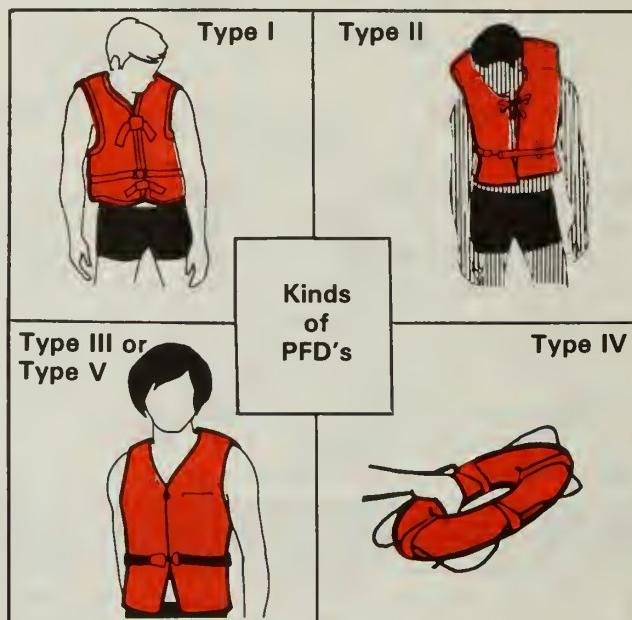
Buoyant vests come in several designs and colors. Materials are similar to those used in life preservers. They are available in four sizes: adult, child (medium), child (small), and infant. They should all fit snugly.

A Type II PFD contains at least 15.5 pounds of

buoyancy. It is not as effective as a Type I device in rough water or for long periods. However, a Type II device is more comfortable to wear.

Both Type I and Type II PFDs are designed to turn an unconscious person face up or slightly backward in the water. Properly worn, they will keep a person's head and shoulders above water.

Neither a life preserver nor a buoyant vest is intended as a swimming aid. A PFD is not a water toy.



### Special Purpose Devices—Type III

Type III PFDs are more comfortable than other types of flotation devices. They are designed so a conscious person can float in a vertical or slightly backward position and keep their head above water. However, the Type III PFD has little or no turning ability and may not turn an unconscious person upright in the water.

Since these devices were made with comfort in mind, they are particularly useful when water skiing, sailing, or hunting. In fact, there is a good looking Type III device for almost every water sport. Ski vests and float coats are Type III PFDs.

### Throwable Devices—Type IV

Type IV devices include buoyant cushions and ring buoys. A throwable device will provide adequate support for a person in an emergency. Used for throwing to people in the water, they do not give the protection available from a wearable device.



# LIFE SAVING

Buoyant cushions contain kapok, fibrous glass or unicellular plastic foam. They come in a variety of colors and are fitted with grab straps.

Buoyant cushions are not recommended for use by children or non-swimmers. They are difficult to hang onto in the water. To use, hold onto the cushion while entering the water. Then put your arms through the straps so that the cushion falls across your chest. NEVER wear a cushion on the back. This tends to force the wearer's face into the water.

NEVER use a buoyant cushion as a boat *fender*.

Ring life buoys are used more on cruisers than on runabouts. When throwing a ring buoy, take care not to hit the person in the water.

## Restricted Special Purpose Device — Type V

A Type V PFD is any PFD approved by the U.S. Coast Guard for restricted use on vessels used for a specific activity such as canoeing, rafting, kayaking, sail boarding, or for commercial uses.

## Checking Your PFD

Buoyancy is the force that keeps a person's head and chin out of the water while afloat. Most people don't have enough natural buoyancy and the difference must be made up by a PFD. Buoyancy changes with body weight, clothes and breathing, so it's important to keep PFDs in good condition.

Test your PFD periodically in shallow water. Keep arms and legs below the surface and assume a relaxed position. Note the position of your head and chin.

Most Type I and II devices have three compartments filled with kapok or similar material, contained in plastic bags. Each bag must be airtight. If air

escapes from a bag when the ends are pushed together, destroy the PFD. (Buoyant cushions also use sealed plastic bags that must be airtight.)

Examine the straps to make sure they are attached securely. The buckles and metal fasteners must be functional and free of rust. Rips and tears in the fabric are not permitted.

## PFDs Must Be U.S. Coast Guard Approved

ONLY U.S. Coast Guard approved life saving devices, in good condition, are legal. Before buying PFDs, check the label designating U.S. Coast Guard approval. PFDs must also be of appropriate size for the persons who will be wearing them. Adult devices are too loose fitting for children and childrens' devices do not have enough buoyancy for adults.

The Coast Guard has not approved ski belts. They do not assure upper body support and may become loose or shift position on the body.

## U.S. Coast Guard Regulations

- Boats sixteen (16) feet or over in length must be equipped with one Type I, II, or III (Wearable PFD) for each person on board or being towed on water skis, plus one Type IV (Throwable) in case someone falls overboard.
- Boats less than sixteen (16) feet in length, and all canoes and kayaks, must be equipped with one Type I, II, III, or IV PFD for each person on board or being towed on water skis, etc.
- A Type V PFD may be carried in lieu of any PFD, but only if the Type V PFD is approved for the activity in which the boat is being used.

## PFD Types

I



**LIFE PRESERVER.** 20 pounds buoyancy. Turns unconscious person from downward position to vertical or slightly backward position. Acceptable for all boats.

II



**BUOYANT VEST.** 15.5 pounds buoyancy. Turns unconscious person from downward position to vertical or slightly backward position. Acceptable for all recreational boats.

III or V



**SPECIAL PURPOSE DEVICE.** Not designed to turn unconscious person face up. 15.5 pounds buoyancy. More comfortable for water sports.

IV



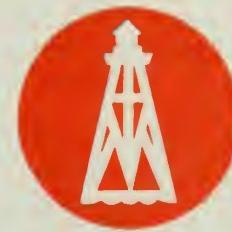
**THROWABLE DEVICE.** 16.5 pounds buoyancy. Designed to be thrown, not worn. Acceptable for boats less than 16 feet, canoes and kayaks, and as throwable device for boats 16 feet and over.



# SKIPPER'S SCORE

1. The most popular kind of motor for boats is an \_\_\_\_\_.
2. Nearly all outboard engines use gasoline that has \_\_\_\_\_ mixed with it.
3. What does overpowering mean? \_\_\_\_\_  
\_\_\_\_\_
4. What should you do if you spill gasoline aboard a boat? Why?  
\_\_\_\_\_  
\_\_\_\_\_
5. To be safe, motorboats should carry fire extinguishers approved by the \_\_\_\_\_.
6. How can you tell the number of people your boat will carry safely without becoming overloaded?  
\_\_\_\_\_
7. A ventilation system is used to remove \_\_\_\_\_ from engine and fuel tank compartments.
8. When must a boat show lights?  
\_\_\_\_\_
9. How are fire extinguishers classified?  
\_\_\_\_\_
10. A carburetor backfire flame arrestor helps reduce the chance of \_\_\_\_\_.
11. What maneuvers do boats' whistles, horns and bells signal?  
\_\_\_\_\_
12. What are PFD's?  
\_\_\_\_\_
13. What is the regulation for PFD's on a boat 16 feet or over?  
\_\_\_\_\_
14. What are the different types of lifesaving devices?  
\_\_\_\_\_
15. What should you do with a PFD that has become torn, stiff or heavy.  
\_\_\_\_\_

# NAVIGATION

**X. Chapter 10—Aids**

- A. Minor lights
- B. Range lights
- C. Lighthouse
- D. Radio signals
- E. Fog Signals
- F. Buoys
- G. Red right returning
- H. Buoyage marking system
- I. Intracoastal beacons
- J. Uniform state waterway marking system

**XI. Chapter 11—Compass**

- A. Compass card
- B. Lubber's line
- C. Nautical charts

**XII. Chapter 12—Weather**

- A. Uncertain and difficult to predict
- B. Winds and currents
- C. Allowing for leeway
- D. Tides
- E. Weather signals
- F. Sea anchor
- G. Procedure when caught in foul weather

**XIII. Chapter 13—Locks and Dams**

- A. Locks get boaters around dams
- B. Flashing red light means do not enter
- C. Flashing amber light means approach with caution
- D. Flashing green light means enter the lock
- E. One long blast means enter the landward lock
- F. One short blast means leave the landward lock
- G. Two long blasts mean enter the riverward lock
- H. Two short blasts mean leave the riverward lock
- I. How lock systems work
- J. Dams can be dangerous



# A SKIPPER'S TALE

## Grey Giant in the Fog

Looking out for yourself *and the other guy too*, applies strongly to safe boating, especially when caught in heavy fog.

Two river fishermen learned this early one morning as they trolled slowly up a river blanketed by fog. The outboard's whine covered the rushing sound of an oncoming bow wake.

Suddenly they looked up. The huge rusted steel plates of a tugboat's bow burst through the blanket of fog which surrounded them.

Instinctively the man in the bow of the 12-foot boat lurched toward the giant. He pushed away from the cold, towering hulk as hard as he could as his partner gunned the motor away from the fast moving intruder. A backwash of river water, half filled the small boat but the two managed to stay afloat. Full power from the sputtering outboard moved them slowly away from the slithering gray form that was silently slicing by. They were far enough away to miss the propeller blades breaking the water on each side of the stern. But not far enough away to keep

from being capsized by the eight-foot stern wake that picked them up and rolled them over into the cold, river water.

Swallowing repeatedly to keep from panicking, they grabbed for seat cushions and futilely at disappearing tackle as the boat bobbed up, with only its bottom out of the brown river.

It was quite a time before their hollers for help reached another river fisherman. The fisherman found the two by going in the direction of their shouts. He would cut his motor and listen, then inch toward the sound until he finally found them.

Whose fault?

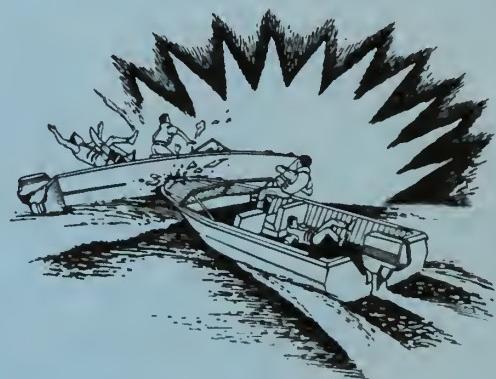
The tugboat's captain was probably sounding his fog horn in accordance with regulations; an outboard could easily drown out this warning. How about radar? It might have helped if the fishermen had used a radar reflector or even held a metal bucket up with an oar or on the mast, a trick sailboaters use when becalmed.

The fact of the matter is, everyone must be cautious when in a position where they can't see. Extra precautions are a necessity under such conditions.

## Sounding Fog Signals Will Prevent Collisions

Both Inland and International Rules of the Road require any vessel that is underway *in or near* an area of poor visibility to sound a warning signal *at least* every two minutes. An area of poor visibility contains fog, mist, falling snow or heavy rainstorms.

Using a whistle or horn, motorboat operators must sound one prolonged blast (four to six seconds in length). Sailboat operators must sound one prolonged blast (four to six seconds in length) *plus* two short blasts (each lasting one second), *regardless of tack*.

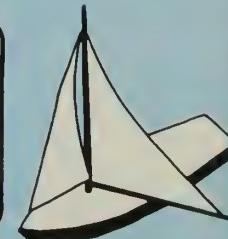


*Remember these rules when caught in fog!*



**Motorboats:**  
**ONE PROLONGED BLAST  
EVERY TWO MINUTES!**

**Sailboats:**  
**ONE PROLONGED BLAST  
AND TWO SHORT BLASTS  
EVERY TWO MINUTES!**



**Note:** If anchored in an area of poor visibility, all boats must ring a bell rapidly for about five seconds at one minute intervals.



# Chapter 10 AIDS

Navigational aids are similar to traffic signs. They help guide boaters on bodies of water by:

1. Helping them find their location
2. Warning them of danger
3. Guiding the boat from place to place
4. Pointing out special marine situations

Aids may be natural structures. Usually, they are artificial markers. They may be floating or non-floating. They are installed and maintained by the U.S. Coast Guard.

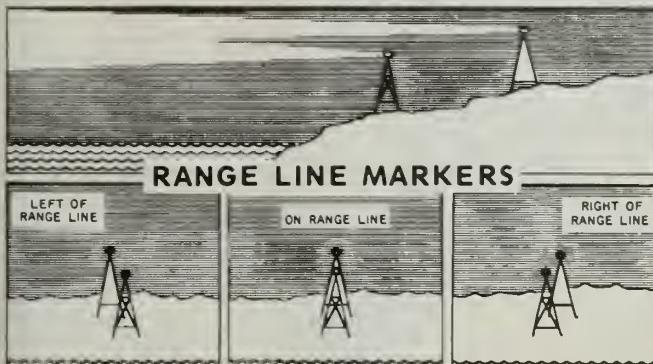
Natural aids are land features such as high peaks, bluffs or beaches. They can also be manmade structures like tall buildings or bridges.

Artificial markers may be lighted or unlighted. Shape, size, and color are also important. Markers are found in the water and along the shore. All boaters should know the navigational aids on the waters they travel.

Visual aids include minor and range lights, lighthouses, buoys, beacons, day marks, special marks and safe water marks. Electronic and audio aids include radio beacons and fog signals.

## Minor Lights

These structures may be painted like lighthouses. They are red, black or green following the buoyage marking system. They may have low-powered, continuously operating radio beacons and fog signals.



## Range Lights

Range lights may be white, red or green and may be fixed or flashing. They are arranged so when in line (one over the other) they indicate that the boater is on a safe course. They are usually visible only in one direction. By steering a course to keep these lights in line, the boater will remain within the channel. Many range lights are located on shore, so a chart is necessary to determine where to change course.

## Lighthouses

Lighthouses are found along the coasts. They are placed on prominent headlands, at harbor entrances,

or on isolated dangers. These structures are painted solid colors or with bands or patterns. The lights have colors and flashes which help you identify them.

## Radio Beacon

Radio beacons are located at many lighthouses, and shore stations. They emit radio signals in the 285 to 324 kilohertz range. Accurate use is limited to about 100 miles. Small craft operators make good use of the system, which is simple to operate and relatively low in cost.

## Fog Signals

Most lighthouses and some buoys and minor lights are equipped with sound producing devices to aid the mariner when visibility is low. Charts and light lists should be used for positive identification. CAUTION: buoys fitted with bells, gongs or whistles sounded by wave motion may ring at irregular intervals. Positive identification is not always possible.

## Buoys

Buoys are artificial markers. They have distinctive colors, shapes, numbers, lights and sounds to guide boaters along a safe course. When used with the right charts, they help boaters find their position. When visibility is low, buoys with gongs, bells or whistles indicate danger to boaters.

## Red Right Returning

Seafarers use the phrase "red right returning" to remind them of the correct course between red, black and green buoys. It means that red buoys always mark the right or starboard side of the channel when returning to port from open sea (or going upstream in a river.) The opposite also holds true. When leaving port toward sea, red buoys are left and black or green buoys are right. Red buoys are always even-numbered. Black or green buoys are odd-numbered.

On some channels it is difficult to determine the seaward direction. On these waters you must compare the aids which you see with a nautical chart. The Atlantic Ocean is a good example of this.

On most rivers, red is to starboard (right) while proceeding from sea to river head. Don't be confused by local terminology that describes the left bank and the right bank with the flow of the river. To be sure, use a nautical chart.

Sometimes buoys are missing, adrift, or off the charted position or station. Heavy storms, unusual tides or collisions may cause a buoy to move. Even buoys on the correct station should be passed at a distance. They may be very close to the danger which they mark. Report misplaced buoys to the proper authorities.



# AIDS

## Buoyage Marking Systems

United States Coastal waters are marked with a lateral system of buoyage. Lateral means that the sides of the channel are marked. Red nun buoys are on one side and black or green can buoys are on the other. The navigable channel lies between the two. If entering from seaward, the red is on the right and the black or green on the left of the boat. When following a federal lateral system of buoys, boaters can tell which side of the channel a buoy is on by its color, shape and number.

Some buoys mark obstructions. Others are lighted at night. All lighted buoys have the same general shape. Be sure you can identify their color or tell if their number is odd or even before passing them in the daytime. At night, the color of their light may tell you which side of the channel they are on, though both port and starboard lighted buoys may show white lights.

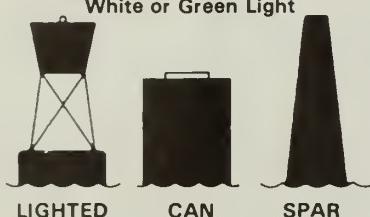
On April 15, 1982, the U.S. Coast Guard signed an international agreement to coordinate buoyage marking systems around the world. Over the next six years, boaters will begin to see changes in certain buoys.

The principal changes are: the color green replaces black for port side buoys; mid-channel buoys will have red and white vertical stripes; lighted mid-channel buoys will be topped by a red ball; special buoys, i.e. "Special Marks" will be yellow; all lateral aids will have red or green lights; use of white lights will be reserved for mid-channel buoys; unlighted mid-channel buoys, i.e. "Safe Water Marks," will be spherical in shape; and the light rhythm for Junction/Bifurcation buoys will be a Composite Group Flashing (2+1). Boaters should regularly check local Notices to Mariners from the Coast Guard for current changes in navigational aids.

## LATERAL BUOYAGE MARKING SYSTEM—seen entering from seaward

### PORT SIDE (Left)

Black or Green  
Odd Numbered  
White or Green Light



The all-black or all-green can or spar buoy is on the port (left) side when going upstream or entering a channel from sea. It may show a white, odd number. Lighted buoys show a white or green light at night.

### DAYMARKS



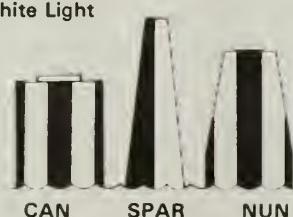
Daymarks identify navigational aids against daytime background conditions. Green square daymarks may appear instead of all-black or all-green buoys. They have a dark green reflective border and mark the left side of the channel. They show odd numbers. Green daymarks on the intracoastal waterway have a yellow stripe or border.

MILE  
BOARD

176.9

### MID CHANNEL

Black and White  
No Numbers, May Be Lettered  
White Light



The black and white striped nun, can or spar buoy marks the middle of the channel. It is never numbered, but may be lettered. Pass close on either side. Lighted mid-channel buoys show a white light at night. Can, spar and nun buoys are being replaced by safe water marks having red and white stripes.

SAFE WATER  
MARKS  
Unlighted  
Mid-Channel



SPECIAL MARKS  
Yellow in Color  
Varied in Shape

### JUNCTION

Marks location where a channel divides

Preferred Channel  
to Starboard (Right)

Green with  
one broad red  
horizontal band

Green Light  
Flashes (2+1)

CAN,  
PILLAR OR SPAR

Preferred Channel  
to Port (Left)

Red with one  
broad green  
horizontal band

Red Light  
Flashes  
(2+1)

CONICAL,  
PILLAR OR SPAR

Buoyage Direction



### DAYMARKS

Red triangular daymarks mean the same as all red buoys. They are red or red fluorescent with red reflective borders. They mark the right side of the channel. Red daymarks on the intracoastal waterway have a yellow stripe or border.

MILE  
BOARD

123.5



# AIDS

## UNIFORM STATE WATERWAY MARKING SYSTEM



## CARDINAL SYSTEM OF BUOYAGE

These buoys are used when there is no well-defined channel.



### CHANNEL MARKER

Boat should pass to north or east of buoy. May be numbered. May show white reflector or light.



### CHANNEL MARKER

Boat should pass to south or west of buoy. May be numbered. May show white reflector or light.



### OBSTRUCTION MARKER

Boat should not pass between buoy and nearest shore. May be lettered. May show white reflector or light.

*Navigational aids guide you safely! Know what they mean and how to use them.*



# SKIPPER'S SCORE

1. Name four ways that navigational aids guide the boater. \_\_\_\_\_  
\_\_\_\_\_
2. What are four natural aids to navigation? \_\_\_\_\_  
\_\_\_\_\_
3. U.S. waters are marked with a \_\_\_\_\_.
4. The navigator should not depend completely on buoys for they may be: (1) \_\_\_\_\_  
(2) \_\_\_\_\_ or (3) \_\_\_\_\_
5. In addition to color and light, buoys may be equipped with (1) \_\_\_\_\_ (2) \_\_\_\_\_  
and (3) \_\_\_\_\_ which aid in navigation.
6. The red nun or red spar buoy should be on the \_\_\_\_\_ side when going upstream  
or entering a channel from sea.
7. The black or green, can or spar buoy should be on the \_\_\_\_\_ side when going upstream  
or entering a channel from sea.
8. Red nun or red spar buoys have \_\_\_\_\_ numbers.
9. Black or green, can or spar buoys have \_\_\_\_\_ numbers.
10. Name five different kinds of navigational aids. \_\_\_\_\_  
\_\_\_\_\_
11. What are the three R's in boating and what do they mean? \_\_\_\_\_  
\_\_\_\_\_
12. How would you get to the marina? Draw a dotted line to show your course.



Note:

Green can buoys may be found  
instead of black can buoys.



# Chapter 11 COMPASS

## The Compass

While not required by law for the private boater, an accurate compass is probably one of the most important and interesting pieces of equipment on a boat. In its simplest form the compass is a magnetic needle that points North.

Small boat compasses use a compass card instead of a needle. This is simply a round disk that is marked with 360 degrees and all of the different directions. It is made so that the "N" (or zero degree mark) points to North at all times. The compass has a reference point called a *lubber's line* and the numbers or letters directly under the lubber's line indicate the direction in which the boat is heading.

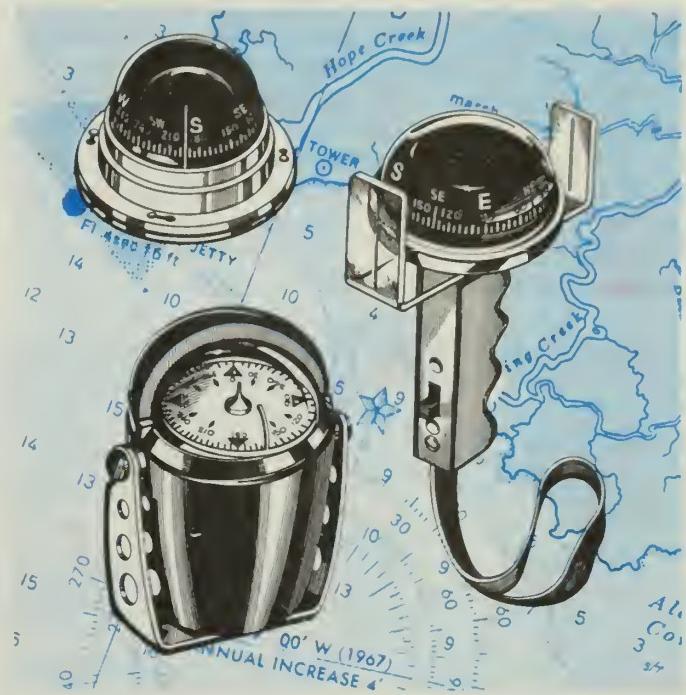
Contrary to common belief, the compass card or the needle of the compass does NOT turn. It stands still and the boat along with the frame of the compass turns around it. The lubber's line is attached to the frame. Therefore, you can look at the compass and see which direction you are going by reading the numbers that appear directly under the lubber's line.

Practice steering a course, that is, draw a line across the *chart* (maps of water areas are properly called charts) from where you are to where you wish to go. Note the direction of your course and hold that direction with your compass until you reach your destination. Did you steer a straight line or did you have to change your heading often? With a little practice you'll find that steering a course with your compass will leave a straight wake behind your boat, proof that you're not zig zagging your way across the water. This helps save fuel.

To understand better how to use a compass, simply hold a boat compass in your hands and note the direction by using the lubber's line. That is your course to a point across the room. With the compass steady, walk across the room holding your course. Now turn around and come back. If you do it properly you'll add or subtract exactly 180 degrees.

Practice finding the return course by adding or subtracting 180 degrees. Remember the answer always has to be LESS than 360 degrees. For example if your outbound course is 40 degrees, you can return to your starting point by cruising 220 degrees. Never confuse 030 with 300 degrees. Most compasses do not show the last zero, therefore, 3 on your compass indicates 30 degrees and the number 30 means 300.

Once you have your compass properly adjusted for your boat, keep metal objects, especially anything with a magnet like a flashlight, small radio or stereo speaker as far away as possible. Magnetized or large metal objects may turn your compass card from



several feet away. Electric wiring is always suspect if it runs close to your compass. Be sure to check your compass by switching all the electrical switches on and off. Snapping on the running lights could change your compass card by several degrees or make it fail completely.

Take care of your compass because the day will come when you'll need it and will need to know how to use it.

## Nautical Charts

Most areas have charts available to help boaters avoid dangers and find their way from one point to another. They are available from chart agents which are usually located at local marinas.

Charts provide detailed information about water depth, buoys, dangers under the water and over it, as well as an accurate picture of shorelines, waterways and harbor areas.

Estimating one's position from a boat is always difficult because distance is deceiving over the water. The best rule for finding your position is to identify at least three landmarks or navigational aids and compare their positions to the chart you are using.

Keeping an eye on only one point is a good way of going aground or running over rocks that are plainly marked on your chart. Learning to recognize the landmarks and navigational aids is a skill that only comes with practice.



# Chapter 12 WEATHER

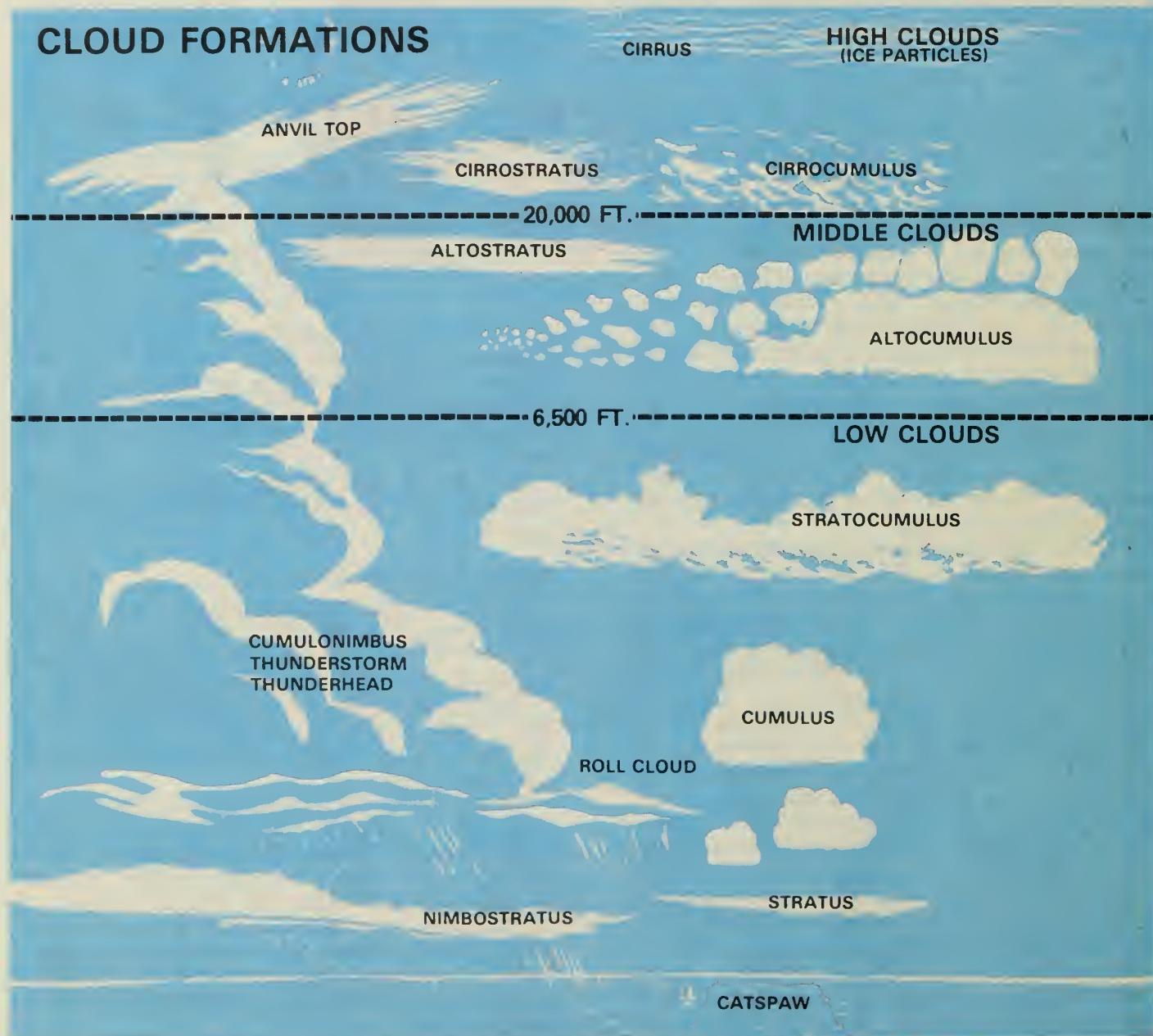
Weather is uncertain and difficult to predict, even for a professional. Always watch for signs of changing weather. Check reports and forecasts often.

While no rules are always true, here are a few guidelines to help you predict weather changes.

**Bad weather changes usually come from the west.** A storm to the west will hit soon. It seldom passes by. Storms to the north or east may pass over. But, be prepared! There is also a good chance of getting caught right in the middle of it.

**Watch for a wind shift.** This usually means that the weather is changing.

**Check the barometer.** Moving air creates pressure changes as it passes over the earth. A barometer registers air pressure. When pressure is high, the barometer has a high reading. A rising barometer indicates fair weather ahead. When pressure is high, clouds are high in the sky. Low clouds usually accompany low pressure and a falling barometer usually indicates bad weather.





# WEATHER

## Winds and Currents

Winds and *currents* can greatly affect a motorboat's course. If a boat sits deep in the water, it will be influenced more by current than wind. Likewise, a high-riding boat will be affected more by wind than current. In plotting a course, take winds and currents into account. Before taking a motorboat into strong currents or winds, practice safe handling in calm waters.

Always allow *leeway* for current and wind. When underway, check all navigational signs and aids frequently. If one has been missed, do not proceed. Turn back until the proper course is re-established. If lost, anchor and wait for help. Remember, always allow for leeway to stay on course.

A motorboat in a river or stream is best handled going against the current. Going down stream, the boat must go faster than the current. Otherwise, it cannot be steered. Never drift in strong currents. In narrow channels, current speed increases. In wider channels, the current usually slows down.

Currents and winds can be very helpful to the boater. Learn how to use them to advantage.

## Tides

The movement of tides affects water speed and depth. Water depth may vary by 10 feet or more on tidal waters. A safe course at noon may be dangerous three hours later. Learn to read and understand tide tables.

## Wind-barometer Table

Wind Direction	Barometer Reduced to Sea Level	Character of Weather
SW to NW	30.10 to 30.20, steady	Fair, with slight temperature changes for 1 or 2 days.
SW to NW	30.10 to 30.20, rising rapidly	Fair followed by rain within 2 days.
SW to NW	30.20 and above, stationary	Continued fair with no decided temperature change.
SW to NW	30.20 and above, falling slowly	Slowly rising temperature, fair for 2 days.
S to SE	30.10 to 30.20, falling slowly	Rain within 24 hours.
S to SE	30.10 to 30.20, falling rapidly	Wind increasing in force, with rain within 12 to 24 hrs.
SE to NE	30.10 to 30.20, falling slowly	Rain in 12 to 18 hours.
SE to NE	30.10 to 30.20, falling rapidly	Increasing wind and rain within 12 hours.
E to NE	30.10 and above, falling slowly	In summer, with light winds, rain may not fall for several days. In winter, rain in 24 hours.
E to NE	30.10 and above, falling fast	In summer, rain probably in 12 hours. In winter, rain or snow, with increasing winds, will often set in when the barometer begins to fall and the wind sets in NE.
SE to NE	30.00 or below, falling slowly	Rain will continue 1 or 2 days.
SE to NE	30.00 or below, falling rapidly	Rain with high wind, followed within 36 hours by clearing, and in winter, colder.
S to SW	30.00 or below, rising slowly	Clearing in a few hours, fair several days.
S to E	29.80 or below, falling rapidly	Severe storm imminent, followed in 24 hours by clearing, and in winter, colder.
E to N	29.80 or below, falling rapidly	Severe NE gale and heavy rain; in winter, heavy snow and a cold wave.
Going to W	29.80 or below, rising rapidly	Clearing and colder.

NOTE: The table includes general statements about the weather and can be very useful. However, the latest official Weather Bureau forecast should be used whenever the forecast is available. These forecasts are available on scheduled marine radioplane broadcasts, from commercial radio stations, and from the Weather Bureau offices.



# WEATHER



## Weather Signals

When potentially dangerous wind or sea conditions exist or are forecast, storm signals are displayed. These include small craft, gale, storm and hurricane warnings. Small craft warnings are directed to craft of many sizes and designs. Do not set out in storm warnings unless the boat can handle the conditions forecast. Check with local weather stations, Coast Guard radio or Weather Service broadcasts (162.55 or 162.40 MegaHertz) for the latest weather forecast. Also check local weather and sea conditions.

When afloat, watch for these signs of dangerous weather ahead:

1. Dark, threatening clouds may indicate a squall or thunderstorm.
2. Watch for a steady increase in wind or sea. Pay special attention to increasing winds blowing against a strong tide. Steep waves may form. These could capsize a boat.
3. Heavy static on the AM radio may indicate thunderstorms nearby.
4. Always check radio and TV weather broadcasts and warnings before going out.

Fog can be a serious threat to the boater. It often forms on coastal waters, especially during summer. Fog may reduce visibility to only a few feet. Landmarks and navigational aids disappear. At the first sign of fog, the boater should proceed to the nearest

buoy to establish his position. If safe to do so, he should then return to the harbor.

It is wise to record the compass course and time between buoys upon departure and return to the harbor. This easy reference may someday help avoid disaster.

### Sea Anchor



## Caught in Foul Weather

1. Reduce speed. Proceed with caution. Put on PFDs.
2. Head for nearest shore that is safe to approach. Stay in protected area until storm subsides.
3. Head bow into waves at slight angle. Watch for floating debris.
4. Secure loose items. Have emergency gear ready.
5. Keep bilges free of water. Shift to full fuel tank.
6. Seat passengers on bottom of boat near center line. Rig in canvas top.
7. If motor fails . . . drag sea anchor (tackle box, bucket or shirt with neck and sleeves knotted) from bow.

## National Weather Service Storm Advisories (Discontinued in Some Areas)

	SMALL CRAFT ADVISORY Winds up to 38 m.p.h.	GALE WARNING Winds 39 to 54 m.p.h.	STORM WARNING Winds 55 to 73 m.p.h.	HURRICANE WARNING Winds over 73 m.p.h.
DAY SIGNALS				
NIGHT SIGNALS				



# Chapter 13 LOCKS and DAMS

## Locks Get Boaters Around Dams

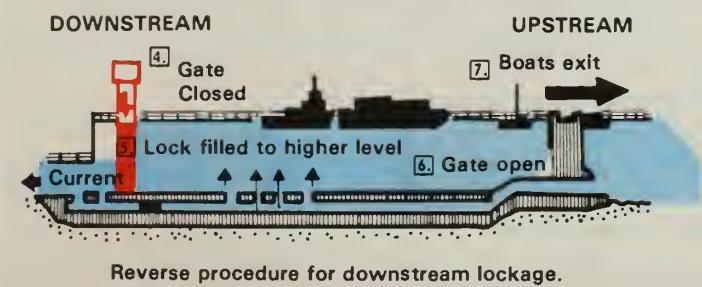
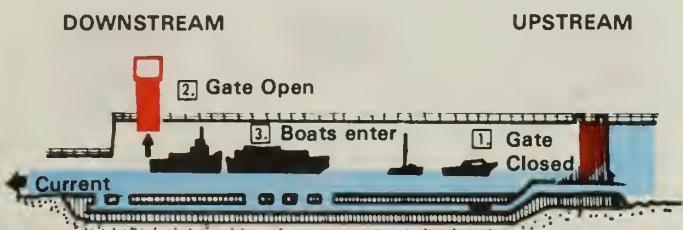
Often on large waterways or rivers there are dams, which makes it necessary for boaters to travel through locks. Know where they are located before beginning a cruise by checking navigational charts. (Available from the Army Corps of Engineers.)

Lock chambers raise or lower the water level so boats may travel above or below dams. Careful safety procedures must be followed when locking through.

Use caution at all times when approaching a lock. Have boat fenders and at least two 50-foot mooring lines ready.

Wait for the lockmaster's signal, either with traffic lights or horn blasts, before moving into the lock. A flashing red light means do not enter. A flashing amber light means approach slowly. A flashing green light means enter. If sound signals are used, one long blast means enter the landward lock, one short blast means leave the landward lock, two long blasts mean enter riverward lock and two short blasts mean leave

## How Lock System Operates

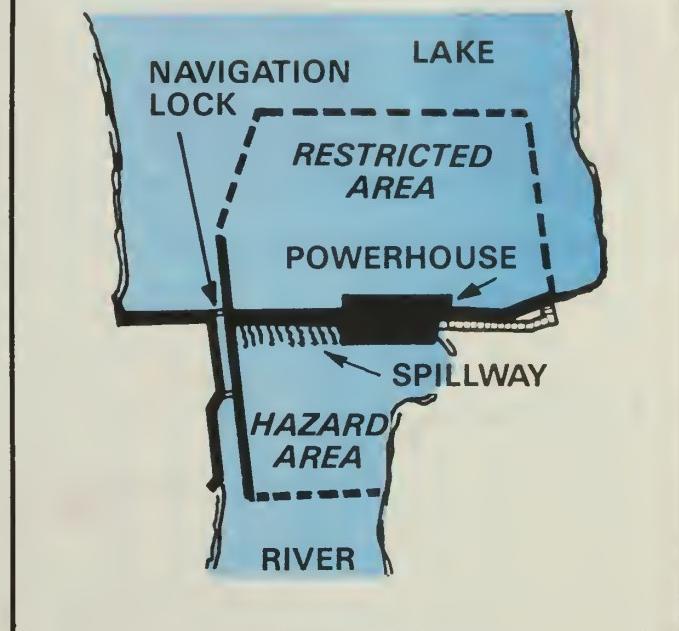


riverward lock. Have mooring lines ready for the lock attendants. Wear a PFD when handling the lines. Follow the attendant's instructions and be ready to adjust or take in lines as the water level rises or falls.

Passengers should remain seated when in the locks. Shut off the motor, wait for the signal to leave and then proceed slowly.

Pleasure craft have low priority during heavy lock traffic. It may be necessary to wait and lock through with other vessels. Whenever locking through with larger craft, boaters should be extra cautious.

## Typical Dam with Navigation Lock



## Dams Can Be Dangerous

All boats should stay clear of dams. Dangerous currents and turbulence may draw a boat into and over a dam. Calm areas both above and below dams can be deceiving. In the seemingly calm areas above dams, there may be slow currents that may pull boaters towards the spillway. Below dams, don't always assume that the downstream current guarantees safety. The undercurrent caused by water moving from a high to low level can create a flow of surface water back toward the dam.

The water just below a dam can be extremely dangerous. When the hydro-electric plant isn't generating, the water is calm and tranquil, inviting boaters to go up close. But this can be a grave mistake. The spillways can open suddenly and pour tons of water on nearby boats. Many serious boating accidents have been caused by boating too close to dams.



# SKIPPER'S SCORE

1. Though not required by law the \_\_\_\_\_ is one of the most important pieces of navigational equipment.
2. A map shows \_\_\_\_\_ formations; a chart shows \_\_\_\_\_ formations.
3. Name four different ways a boater can watch out for dangerous weather approaching.  
(a) \_\_\_\_\_  
(b) \_\_\_\_\_  
(c) \_\_\_\_\_  
(d) \_\_\_\_\_
4. A barometer registers \_\_\_\_\_
5. Low clouds usually accompany: (a) high (b) low pressure.
6. In addition to wind, a motorboat's course can be affected by \_\_\_\_\_
7. What is leeway? \_\_\_\_\_

8. Identify the following storm signals:

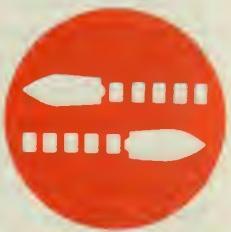
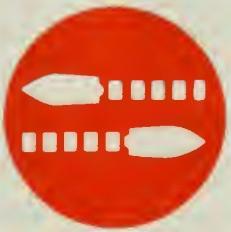
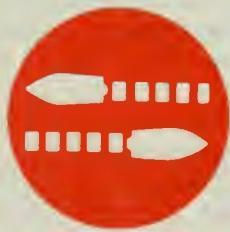
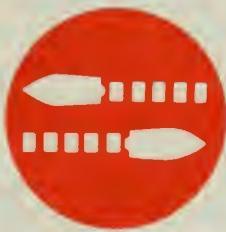
- (a) \_\_\_\_\_  
(b) \_\_\_\_\_  
(c) \_\_\_\_\_  
(d) \_\_\_\_\_



9. What is the first thing you should do if caught in foul weather? \_\_\_\_\_
10. You should \_\_\_\_\_ your boat into the waves if caught in bad weather.
11. What is a sea anchor? \_\_\_\_\_
12. Three articles which can be used as sea anchors in an emergency are: \_\_\_\_\_
13. What are locks used for? \_\_\_\_\_
14. All passengers should remain \_\_\_\_\_ when in locks.
15. Locks have \_\_\_\_\_ and \_\_\_\_\_ to help direct you through.



## SAFETY ON THE WATER



### XIV. Chapter 14—Rules of the Road

- A. Basic safety regulations
- B. Overtaking situation
- C. Meeting head to head
- D. Crossing situation
- D. With wind or current from the dock
- E. With wind or current toward the dock
- F. With wind or current astern
- G. Anchoring
- H. Types of anchors

### XV. Chapter 15—Preparation

- A. Loading
- B. Boarding
- C. Boating checklist
- D. Alcohol on board
- E. Boating float plan
- F. Equipment for safety afloat

### XVI. Chapter 16—The First Cruise

- A. Steering
- B. Leaving the dock or pier
- C. Skipper's duties when underway
- D. Cruising

### XVII. Chapter 17—Mooring

- A. Docking
- B. Without wind or current
- C. Into wind and current

### XVIII. Chapter 18—Knots

- A. Square knot
- B. Bowline
- C. Anchor bend
- D. Clove hitch
- E. Half hitch
- F. Cleats

### XIX. Chapter 19—Water Sports

- A. Water skiing
- B. Diving
- C. Rowing
- D. Canoeing and kayaking
- E. Fishing
- F. Hunting
- G. Alcohol and boating don't mix
- H. Farm ponds
- I. Swimming



# A SKIPPER'S TALE

## It Takes Three to Ski

Rob and Kim, both high school students, had prepared carefully for an afternoon of water skiing fun on the large lake in their hometown. Rob's boat had been checked out carefully; the gas tanks were full and the boat had two life preservers, a buoyant cushion and a ski vest aboard, all U.S. Coast Guard-approved devices.

David, an acquaintance of theirs, had been invited to come along as an observer. It would be his job to watch Kim carefully as she skied and to pass her signals along to Rob who would be at the wheel.

Kim was an experienced skier and knew the benefits of the special purpose ski vest, so she put it on and hopped in the water. As it turned out she was lucky to be wearing it.

The first run was a good one. Kim got up on her ski easily and signalled the boat through a number of wide, easy turns. The lake was dotted with other

pleasure boats; Rob was careful to stay clear of them.

On the second run, though, Rob made a sharp turn to avoid hitting a swimmer that he hadn't noticed in time. Kim was jerked off her ski which shot out of the water and cut her on the head as it fell back into the lake. Though her injury was not serious, Kim was stunned, confused and in pain. Fortunately, the ski vest had kept Kim's head out of the water, averting an even more serious situation.

By the time the boys circled back and brought Kim in over the stern of the boat, she was beginning to regain awareness. Though the cut was not serious it was bleeding profusely, but Kim did not panic. David applied pressure to the wound with a towel while Rob headed quickly for shore.

No great damage was done, but a pleasant afternoon was spoiled. Rob felt that he should have been more alert to swimmers straying from swimming areas, but most of all, he was glad Kim had been wearing a U.S. Coast Guard approved ski vest.

## Drinking and Boating

Spend a sunny day on a constantly rocking boat, squinting against the glare, and your body's energy is drained. Add too much alcohol and you could be in trouble. (See chart below.) Here's why:

**1. Balance**—Most people killed in boating accidents fall out of boats and drown. Balance is one of the first things impaired by drinking—even one beer can affect equilibrium. Drowning statistics indicate that intoxicated people can't swim, no matter how well they swim when sober.

**2. Judgement and Reasoning**—While drinking, people feel as if their mental reactions are sharper and quicker than they are normally. Drinkers don't realize that their reactions are actually slower than usual and only seem quicker because their own ability to judge them is impaired. An intoxicated person cannot correctly eliminate distances and speeds.

**3. Risk-taking**—Drinking reduces inhibitions, especially among young, inexperienced people. This causes them to take chances they normally wouldn't.

**4. Slowed Responses**—Physical reflexes are slowed by alcohol so responses are delayed. This problem is more serious on a boat because the controls are relatively unfamiliar (even if you go out regularly), when compared to operating the car you drive daily.

**5. Vision**—Drinking slows a person's eye recovery from glare, as well as the ability to identify and track moving objects. Sensitivity to red decreases, as in port running lights, especially at night.

Contrary to popular belief, alcohol isn't digested like food, but is absorbed directly into the bloodstream through the stomach walls. Food in your stomach slows down alcohol absorption, but the final amount of absorption is the same. The liver burns or oxidizes alcohol out of your body at a steady rate. If you drink faster than the alcohol can be burned, there will be a greater level of alcohol in your blood. This is called blood alcohol content (BAC) and may be estimated by referring to the chart below.

Only time can sober you up—not coffee, a cold shower, fresh air or exercise. Use this general rule: It takes as many hours as the number of drinks consumed to sober up completely. Figure your own safe limit from this chart.

Body Weight in Pounds	Number of Drinks in a Two Hour Period								
	12 oz. beer = 5 oz. wine = 1 oz. 80 proof liquor								
100	1	2	3	4	5	6	7	8	9
120	1	2	3	4	5	6	7	8	9
140	1	2	3	4	5	6	7	8	9
160	1	2	3	4	5	6	7	8	9
180	1	2	3	4	5	6	7	8	9
200	1	2	3	4	5	6	7	8	9
220	1	2	3	4	5	6	7	8	9
240	1	2	3	4	5	6	7	8	9

BAC to .05%  
 BAC .06% to .09%  
 BAC 10% and over

Be careful! Loss of judgement, decreased coordination, thinking dulled, changes in mood and behavior.  
 Operating ability impaired! Walking, speech, and hand movements clumsy. Blurred, split or tunnel vision may occur. Judgement and boat operating ability impaired. Chance of accident is greatly increased.  
 Do not operate a boat! Inhibitions and judgement seriously affected. Responses slowed and dull. Behavior greatly affected. High risk of accident.

# Chapter 14 RULES of the ROAD

Navigational skills, like driving skills, are meaningless without a set of basic *rules of the road*. These rules are often common sense guidelines. The reason for having rules is to prevent collision. They supply uniform patterns of passing, direction and safe operating behavior. They help prevent accidents.

## **State Laws**

Many state laws have very specific requirements. Check them carefully. Use these guidelines only as a starting point.

### **1. Reckless or Careless Operation**

Avoid causing harm or injury to any person, boat or property. Respect the property and rights of others on the water.

### **2. Operator Awareness**

Always keep a sharp lookout for other boats, swimmers or obstacles. Never operate a boat while under the influence of alcohol or drugs. In many states, it is illegal for the owner to permit operation of the boat by anyone under such influence. The boat's operator must be free from physical or mental disabilities which might interfere with control of the boat.

### **3. Speed Regulations**

Watch your wake! Obey posted speed limits. When no limits are posted, operate the boat so it will not endanger others. The boat must be able to stop safely within the clear distance ahead. When passing near marinas, fishing areas, swimming areas, boats servicing buoys or similar activities, reduce speed to prevent wake from damaging or inconveniencing those in the area. The skipper is responsible for any damage caused by wake.

### **4. Restricted Areas**

Some waterways limit boat or motor size and use. Check local and state regulations before departing. In some cases, a permit may be necessary.

### **5. Overloading**

Consider weather and existing conditions. Never load a boat with passengers or cargo beyond its safe carrying capacity. For a guide, check the manufacturer's load capacity plate. (See page 27.)

### **6. Riding on Decks or Gunwales**

Riding on decks or *gunwales* is dangerous. Falling overboard is very easy from either of these positions.

Deck rails are an added safety factor and common sense is a must.

### **7. Interference with Navigation**

Never obstruct a passageway or interfere with the travel of other boats. Avoid anchoring in heavily traveled areas. Do not block launching areas.

### **8. Mooring to Buoys**

Only mooring buoys should be used for mooring. Mooring to a buoy or other aid to navigation is illegal.

### **9. Sewage Disposal**

Use marine toilets equipped with a holding tank so sewage is not pumped directly into the water. Check local regulations but also use common courtesy. Never throw litter or garbage into the waters. Don't add to the pollution of the state's waterways.

### **10. Prohibited Operation**

No person shall operate any vessel or manipulate any water skis, surfboard or similar device in a careless, reckless or negligent manner so as to endanger the life, limb or property of any person.

No person shall operate any vessel, or manipulate any water skis, surfboard or similar device while intoxicated or under the influence of any narcotic drug, barbituate or marijuana.

The penalty upon conviction for any such operation is a fine of not more than \$500 or imprisonment for not more than six months, or both. If the violation results in the death of any person, the penalty upon conviction shall be a fine of not more than \$1,000 and imprisonment for not more than one year.

### **11. Water Skiing**

Water skiing is usually prohibited from sunset to sunrise or as regulated by local law. Always watch for other boats and swimmers. Always have at least two people in the boat. When water skiing on open waters, operate in a counter-clockwise direction if possible. In Massachusetts the boat must also be equipped with a boarding ladder, steps or similar device which can assist the person skiing from the water.

### **12. Races and Regattas**

Specific regulations apply to regattas, races, marine parades, tournaments or exhibitions. Check with the Director of the Division of Marine and Recreational Vehicles.



# RULES of the ROAD

On the water the stand-on (privileged) boat has the right-of-way. The give-way (burdened) boat must keep out of the other's way. At night, running lights indicate which boat has the right-of-way. The lights give information about size, direction, speed and the way it is turning. A green light is on the starboard (right) side of the boat; a red light on the port (left) side. If a red light is visible, that boat is the stand-on (privileged) boat. The location of the white stern light helps tell what the other boat is doing. Always use common sense ... This is especially important at night. The other boater may not know what the lights mean!

## OVERTAKING

### Inland Rules

"I want to pass you on your port side."

2 short blasts (1 sec.)

"Proceed"

2 short blasts (1 sec.)

### International Rules

"I am altering my course to port."

2 short blasts (1 sec.)

### International Rules in narrow channels

"I intend to pass you on your port side."

2 prolonged blasts (4-6 sec.)  
2 short blasts (1 sec.)

"Proceed"

1 prolonged, 1 short,  
1 prolonged, 1 short blast

## Stand-on (Privileged) Vessel Being Overtaken

### Inland Rules

"I want to pass you on your starboard side."

1 short blast (1 sec.)

"Proceed"

1 short blast (1 sec.)

### International Rules

"I am altering my course to starboard."

1 short blast (1 sec.)

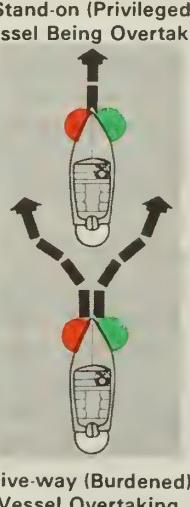
### International Rules in narrow channels

"I intend to pass you on your starboard side."

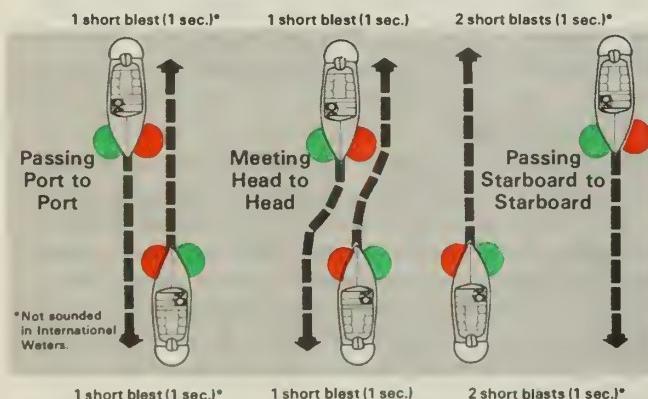
2 prolonged blasts (4-6 sec.)  
1 short blast (1 sec.)

"Proceed"

1 prolonged, 1 short,  
1 prolonged, 1 short blast



## MEETING HEAD TO HEAD or NEARLY SO



## Meeting Situation

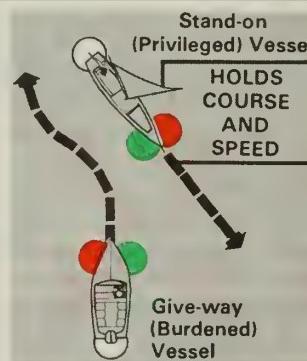
Neither motorboat has the right-of-way. Both boats turn to starboard (right) and pass port (left) to port. The exception occurs when both boats are on the left side of the channel. Then both vessels may sound two short blasts and pass on their starboard sides.

Proceed slowly and with caution. If both boats obey the rules of the road, the maneuver is completed without danger ... and an accident is avoided.

**Note:** Under Inland, Great Lakes and Western Rivers Rules of the Road, signals are sounded to indicate or to acknowledge a desire to maneuver. Under International Rules of the Road, the signals are given when the movement is about to take place.

The following diagrams indicate the proper, safe way to maneuver in several situations. These rules of the road are used on waters throughout the country. Learn them well.

## MOTORBOATS MUST STAY CLEAR OF BOATS UNDER SAIL

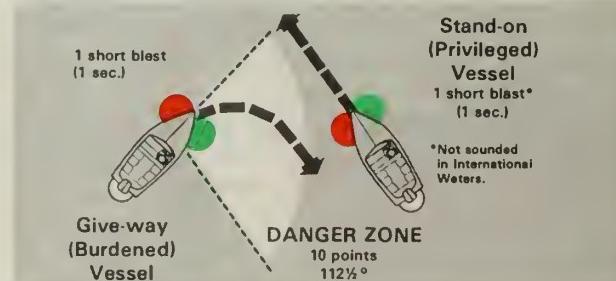


Sailboats have the right-of-way over motorboats—except when overtaking or under power. Sailboats using engines are considered motorboats.

Boats propelled by oars or paddles have the right-of-way over motorboats. Small pleasure craft must yield to large commercial vessels in narrow channels. Large craft cannot move as easily as small boats.

If a collision appears unavoidable, neither boat shall have the right-of-way. Under the Rules of the Road, both boats must act to avoid collision.

## CROSSING SITUATION

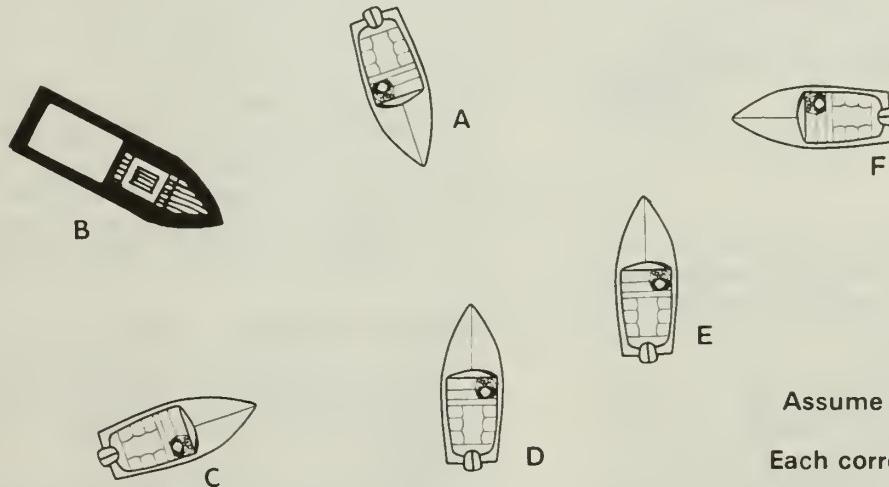


In a crossing situation the boat to starboard (right) has the right of way under both Inland and International Rules. It must hold course and speed. The give-way (burdened) boat keeps clear and passes astern of (behind) the stand-on boat. An exception applies for a boat crossing a river; it must keep out of the way of boats going up or down the river.



# SKIPPER'S SCORE

1. The purpose of the Rules of the Road is to prevent \_\_\_\_\_.
2. What should you do if no speed limits are posted? \_\_\_\_\_  
\_\_\_\_\_
3. Who is responsible for the damage caused by the wake of a boat? \_\_\_\_\_
4. The only kinds of buoys that may legally be used for mooring are \_\_\_\_\_ buoys.
5. What vessels must obey the Rules of the Road? \_\_\_\_\_
6. A boat with the right-of-way is called the \_\_\_\_\_ boat.
7. A boat which does not have the right-of-way is called the \_\_\_\_\_ boat.
8. In a crossing situation the boat to \_\_\_\_\_ has the right-of-way.
9. What must you do if your boat is being overtaken by another boat? \_\_\_\_\_



Assume illustrations are powerboats  
on Inland waters.  
Each correct answer is worth 5 points.

1. C and D are in a \_\_\_\_\_ situation. Under Inland Rules, C signals with one short blast.  
D answers by sounding \_\_\_\_\_. (5 points each)
2. D and E are in a situation of \_\_\_\_\_. \_\_\_\_\_ is the give-way (burdened) vessel.  
\_\_\_\_\_ must maintain course and speed.
3. A and D are meeting \_\_\_\_\_ or nearly so. Both boats must \_\_\_\_\_  
and pass each other on the \_\_\_\_\_ side.
4. Between E and F, \_\_\_\_\_ is the stand-on (privileged) vessel and \_\_\_\_\_ must turn to \_\_\_\_\_.
5. If B is a large freighter, what must C and D do? \_\_\_\_\_

There are 60 possible points. If you did not score at least 50, you need more study. Remember, an accident, once it happens, can't be corrected.



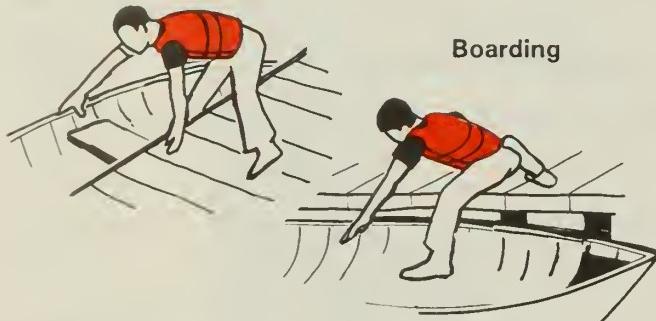
# Chapter 15 PREPARATION

When you prepare for your first cruise, remember that a boat is very unsafe if it is not loaded properly. Careful loading of supplies and equipment as well as passenger safety is the skipper's responsibility.

## Loading

When loading, stow all supplies securely, and well out of the way. Use a checklist to make sure that all equipment is aboard, and always:

1. Keep deck areas clear.
2. Fasten gear to prevent shifting.
3. Distribute all weight evenly.
4. Never overload a vessel.



## Boarding

When passengers are ready to board, the skipper should let them know which area of the boat they may or may not use. Assist them in putting on their PFD's. Make sure that mooring lines remain secured to keep the boat steady while boarding.

When boarding a small boat from a dock or low pier, step aboard *amidship* (center of the boat). Stay low and hold onto the gunwales to keep your balance.

Don't carry equipment when boarding. Keep your hands free and have someone on the dock pass supplies to you after you are aboard.

If the boat is moored by bow lines or beached bow first, board over the bow to keep the craft stable.

When passengers are aboard, the skipper must make sure their weight is distributed evenly so the boat is *trim*. Total weight of the passengers, motor and gear should not exceed U.S. Coast Guard or manufacturer's capacity plate limitations.

Heavy loads decrease a boat's *freeboard* (amount of space between the boat's rail and the waterline). If loaded too heavily, small waves or wakes may swamp the boat. Check your load before getting underway. Make sure the boat is not overloaded.

Passengers should remain seated at all times. If changing seats or standing is necessary, reduce speed to slow or stop completely. When moving, keep low and hang on to the gunwales for balance.

## Boating Checklist

Before casting off, the skipper should go over these final safety checks. Double checking and even triple checking is a good idea.

- 1. Safety equipment, including anchor, line and distress flag, aboard and accessible.
- 2. U.S. Coast Guard approved PFD for each person on board. (Plus one throwable device on vessels 16 ft. or over.)
- 3. Lines coiled and out of way.
- 4. Ample fuel in tanks.
- 5. Paddles or oars on board.
- 6. Lights and whistles in working order.
- 7. Boat checked for leaks; water bailed.
- 8. Bilges clean, free from gasoline vapors.
- 9. Fuel tanks and lines checked for leaks; spilled gasoline wiped up.
- 10. Weather report OK for boating.
- 11. Gear fastened and out of way.
- 12. Passengers seated; boat trim.
- 13. Mooring lines snug.
- 14. Propeller clear of weeds, rocks, etc.
- 15. Motor safety chain attached to boat.
- 16. Motor shut off valve open.
- 17. Tool kit and extra parts on board.
- 18. Skipper is alert and *sober*, aware of local regulations, and in the right frame of mind.

## Alcohol On Board

For many people, beer is the boat's most important cargo. Depending on the amount consumed, alcohol can add to the day's enjoyment or be the cause of a tragedy.

It is everyone's responsibility to control on-board drinking. The easiest way to avoid excessive drinking is to limit the amount of alcohol you bring on board.

Drinking, combined with fatigue due to glare and constant boat motion, causes accidents. Alcohol affects balance and muscle coordination and causes tunnel vision and inability to track moving objects. Excessive drinking slows reaction time, increases the tendency to take risks, and affects reasoning.

People who've had too much to drink lose the ability to judge the effects of alcohol. Learn to recognize these signs:

- Loud talking and slurred speech.
- Clumsy behavior; dropping or spilling things.
- Perspiring, turning pale or red in face.

Any behavior that is unusual for a particular passenger is a possible danger sign. Help insure for a safe and enjoyable boating trip by limiting the drinking of any person on board who shows these signs.



# PREPARATION

## BOATING FLOAT PLAN

This plan for boats is similar to that used by airplane pilots. When you plan to boat, especially on larger waters, it is a good idea to leave information with friends or relatives.

The boating float plan is designed to assist officers in locating you and your boat if something should happen.

Leave this plan with the local marina operator, one of your relatives, or a close friend. (Be sure to cancel the plan when you return.)

## SAFE LOADING FORMULAS

Horsepower Capacity (small, flat-bottom boats)

Multiply boat length (feet) times transom width (feet)

Maximum

If Answer Is: Horsepower Is:

35 or less	2
36-39	3
40-42	5
43-45	7.5
46-52	10

Persons Capacity (average weight: 150 lbs.)

$$\frac{(\text{Boat Length} \times \text{Boat Width})}{15} = \text{Number of People}$$

Boat length and width are measured in feet.  
Round fractions DOWN to next lower person

## Equipment for Safety Afloat

Items	Class A (to 16')			Class 1 (16' to 26')			Class 2 (26' to 40')			Class 3 (40' to 65')		
	Open waters	Semi-protected	Protected	Open waters	Semi-protected	Protected	Open waters	Semi-protected	Protected	Open waters	Semi-protected	Protected
Anchor, cable (line, chain, etc.)	E	E	E	E	E	E	E	E	E	D	D	D
Bailing device (pump, etc.)	E	E	E	E	E	E	E	E	E	E	E	E
Boat hook				D	D	D	E	E	E	E	E	E
Bucket (fire fighting/bailing)	E	E	E	E	E	E	E	E	E	E	E	E
Compass	E	E	D	E	E	D	E	E	E	E	E	E
Distress signals	E	E	E	E	E	E	E	E	E	E	E	E
Emergency drinking water	E	D	..	E	D	..	E	D	..			
Fenders	D	D	D	D	D	D	D	D	D	D	D	D
First-aid kit and manual (10- to 20-unit)	E	E	E	E	E	E	E	E	E	E	E	E
Flashlight	E	E	E	E	E	E	E	E	E	E	E	E
Heaving line							D	D	D	D	D	D
Light list	D	D		E	E	D	E	E	E	E	E	E
Local chart(s)	E	D		E	E	E	E	E	E	E	E	E

1. Equipment is required by conscience and good sense but not necessarily by law.
2. Equipment can be useful in some circumstances.

## Float Plan

1. DESCRIPTION OF BOAT		Inboard _____	Outboard _____
A Boat number and or name _____	B Size _____	C Make _____	D Capacity _____
E No Engines _____	F Horsepower _____	G Fuel Gas _____	H Diesel Capacity _____
2. NO PERSONS ON BOARD _____ Names and Addresses _____ _____			
3. RADIO EQUIPMENT A Ship to Shore _____ B Citizens Band _____ C Channel monitored _____			
4. TRIP PLAN From _____ Via _____ Estimated Time of Arrival _____ Departure Time (variance level) _____			
5. AUTOMOBILE PARKED AT _____ License number _____			
6. I WILL ADVISE TRIP PROGRESS Phone _____ Time _____ Other _____			
7. IF NOT AT DESTINATION BY _____ (Hour) _____ (Day) _____ Notify agencies shown below _____ _____ and advise of this plan			
8. IF EMERGENCY ARISES Contact Coast Guard at _____ _____			
LOCAL Law Enforcement Officer _____			

	Class A (to 16')			Class 1 (16' to 26')			Class 2 (26' to 40')			Class 3 (40' to 65')		
	Open waters	Semi-protected	Protected	Open waters	Semi-protected	Protected	Open waters	Semi-protected	Protected	Open waters	Semi-protected	Protected
Mirror (for signaling)	D	D		D	D		D	D		D	D	
Mooring lines	E	E	E	E	E	E	E	E	E	E	E	E
Motor oil and grease (extra supply)							D	D	D	D	D	D
Oars, spare	E	E	E	E	E	E						
Radio direction finder							D			D		D
Radio, telephone	D						D			D		D
Ring buoy(s) (additional)	D	D	D	D	D	D	D	D	D	D	D	D
Shear pins (if used)	E	E	D	E	E	D						
Depth sounding device, (lead line, etc.)	D	D		D	D	D	E	E	E	E	E	E
Spare batteries	D	D	D	D	D	D	D	D	D	D	D	D
Spare parts	E	D		E	E	D	E	E	D	E	E	D
Tables, current										D	D	E
Tables, tide							D		D	D	..	E
Tools	E	D		E	E	E	E	E	E	D	E	E

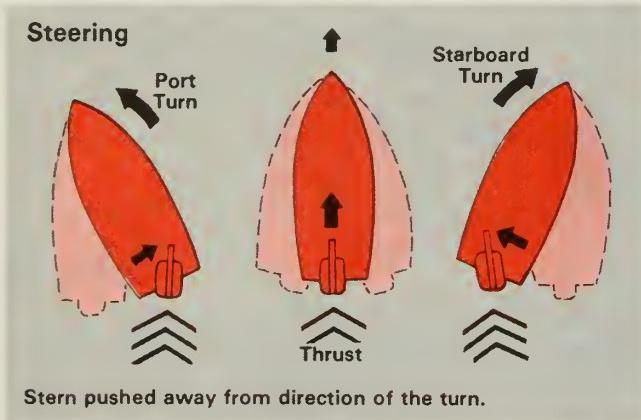


# Chapter 16 The FIRST CRUISE

With the equipment loaded and passengers aboard, the skipper is ready for the first cruise. Keep the *mooring* lines secured and start the engine in neutral. If using an outboard with starting cord, remember to stay seated. If operating an inboard, ventilate the engine compartment for at least four minutes before starting.

Be sure the area is clear before leaving the dock. Cast off lines, signal and pull away slowly. Coil lines and stow them out of the way.

On the first cruise, be sure to take along an experienced adult boater. Then practice making slow turns. Remember the stern moves in the direction it is pushed by the motor. Practice until you feel comfortable at the controls.



## Leaving the Dock or Pier

Here are a few tips to follow while casting off and leaving the dock.

With the wind or tide holding the boat to the dock:

1. Cast off stern line. Keep bow line secured.
2. Turn the motor or rudder to carry the stern away from the pier.
3. Shift into forward, go slowly ahead against the bow line.
4. After the stern swings away from the pier, shift to reverse to gain slack in the bow line. Cast off and back away from the dock until clear.
5. Shift to forward and leave the moorage at slow speed.

On the lee side of the dock:

1. Cast off lines.
2. Use an oar or paddle and push to keep the boat clear of dock.
3. Let the wind or current carry the boat away from the dock.
4. Shift to forward and angle slowly away from the dock.

Once underway, pull in the fenders and make sure all lines are in and coiled. Travel at a slow, no-wake speed until away from docks, floats, swimmers and other craft.

## Skipper's Duties When Underway

The skipper's responsibilities don't end after the boat is loaded and away from the dock area. When underway, always:

1. Be thoroughly familiar with the way that the boat handles. Know the distance that it takes to stop after throttling down, the turning radius, the most efficient cruising speed, etc.
2. Avoid taking any unnecessary risks that may endanger the crew or the boat. Always choose the safest course.
3. Frequently check your position in relation to landmarks and aids to navigation. Know where you are at all times.
4. Note the weather, wind and current, if they are changing and how the changes will affect the boat.
5. Now that you know the rules of the road, (page 50), be sure to follow them. In congested areas, slow down and be extra cautious.
6. Always stop to render assistance to those in danger or distress. This means anything from a stalled engine to more serious situations.
7. In addition to the boat, the skipper is responsible for the passengers aboard. Make sure they stay seated and act in a safe manner.

## Cruising

An overnight cruise is a pleasant way to enjoy boating. There is adventure afloat, things to do and places to see.

First check the boat over carefully. Then chart a course. Stow extra parts and tools aboard. A portable radio is a must for weather reports. Compass, flashlights, drinking water, extra line, toilet articles, insect repellent, warm bedding and matches should all be aboard before setting out.

Be sure to allow plenty of time to reach your destination. Be familiar with the other ports along the way.

Keep a log. It's fun and gives you a record of everything that happened on your trip.

Use the motor wisely. High speeds burn up extra gas and save little time. On boats with planing hulls, get up to planing speed and then throttle back as much as possible while still staying on a plane. This is the boat's most efficient speed and it conserves fuel.



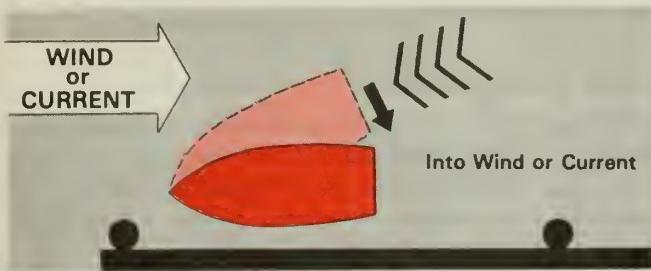
# Chapter 17 MOORING

## Docking

It is a good idea to practice docking in open water with an anchored float. Learn how the current and wind can affect the boat.

When docking, head into the current and wind whenever possible. This gives better control of the boat. If the wind is stronger than the current, head into the wind.

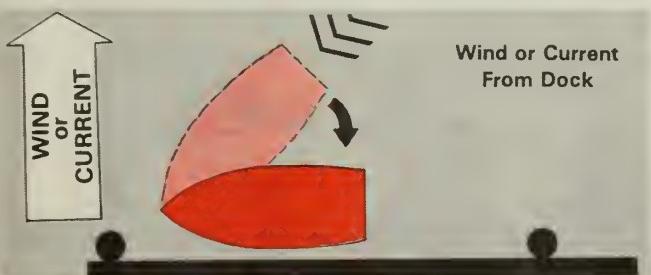
When approaching a dock, move slowly. Have fenders in place and lines ready. Be ready to use forward, neutral and reverse gears. Ramming into a dock will damage both it and the boat. A good skipper doesn't bump any part of the craft. Ease the boat into the landing.



### Into the Wind or Current

When the wind or current is coming from the bow, approach the dock at a slight angle (20 to 30 degrees). When the bow is close to the pier, turn the boat so it is parallel to the dock. Put the bow line over first.

The stern will then swing into the landing. If necessary, shift into reverse to slow the boat.



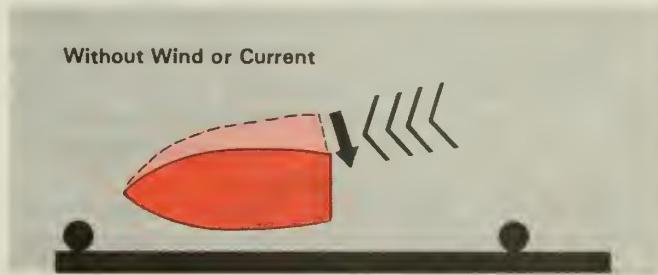
### With Wind or Current from the Dock

When the wind or current is coming from the direction of the pier, again approach slowly, this time at a fairly sharp (45 degree) angle. At the dock, shift into neutral and secure a bow line. Turn the tiller to direct the bow of the boat away from the dock. Next, slowly go forward against the bow line. This will cause the stern to move to the landing.

When close, toss lines to someone on the pier. If no one is available, pull the boat into the dock with a boat hook or your hand. Step ashore with the bow line. Secure this line first and then the stern line, if headed into the wind or current. Don't shut off the engine until all lines are fast.

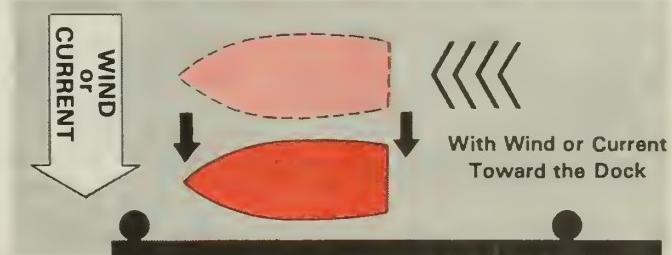
When heaving or throwing lines make sure they are coiled. Heave them underhand for a smoother toss. Use enough line to allow for changes in water level and motion caused by rough water.

Learn how to dock in all possible weather conditions. Here are some basic guidelines for several different situations.



### Without Wind or Current

When there is no wind or current, the skipper should approach the dock at a very slight angle (10 to 20 degrees). When the bow is close to the dock, shift the craft into reverse to slow headway. Then ease into the landing.



### With Wind or Current toward the Dock

With the wind or current moving into the landing, approach parallel to the dock. Shift into neutral and let the wind and current carry the craft into the pier. It may be necessary to do some steering.

### With Wind or Current Astern

Docking with the wind and current coming from behind is very difficult. If unavoidable, be ready to continually use reverse gear to slow momentum. Approach the dock at a slight angle. When the bow is close, use reverse to slow headway. Make fast the stern line first, then the bow line.



# MOORING

## Anchoring

At times the boater may wish to anchor to swim, eat, fish or just to relax. When anchoring, choose a spot with a good holding bottom, protection from the wind, and water of suitable depth. Such an anchorage is good for overnight stays and it frees the skipper from worrying about the weather.

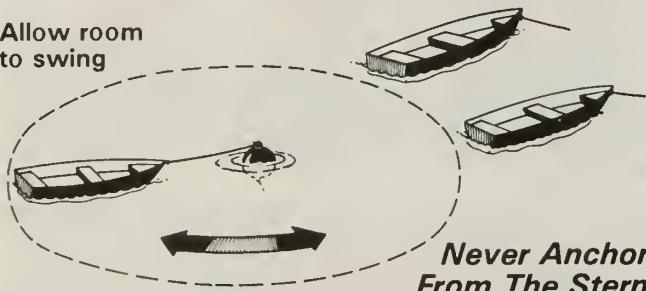
**Anchor line 5 to 7 times water depth**



If mooring near wharves or piers, allow enough clearance for a full circular swing of the boat and the swing of boats moored nearby. Don't depend on the current alone to keep the boat in line. Use an anchor with at least five times as much line as the depth of the water. A long line cushions the shock of rough water on the boat. It helps the anchor hold better. A short length of chain between the anchor and the line will also improve its holding ability.

Before thinking about how to anchor, decide where to anchor. The navigation chart can help find a good, well-protected spot to anchor.

**Allow room to swing**



Move the bow slowly to the spot where the anchor will lie. Slow down, use reverse gear to control motion. Then lower the anchor over the side, hand over hand. Never stand in the coils of line on deck. Don't attempt to heave the anchor by casting from the side of the boat. Lower it as described above, then, the possibility of fouling the anchor is minimized.

With the anchor on the bottom and the boat slowly in reverse, line can be payed out as the boat takes it, preferably with a turn of line around a cleat. Stop the line when it is out about five times the depth of the water. The anchor will get a quick, sure bite into the bottom. Make the line fast and shut off the motor.

After the boat is anchored, line it up with a landmark on the far shore. Then you'll be able to tell if the boat begins to drift.

## Types of Anchors

For many years, anchors were limited to relatively few types. The Navy® anchor was the most popular. Improved variations of each type appeared and radically new designs evolved, based on holding power rather than weight.

The Danforth® and the Northill® are the most popular small boat anchors. The Danforth® is perhaps the most common type. This anchor has tremendous holding power for its weight. In the Danforth® anchor, the flukes are long and sharp. It is designed so that heavy strains will bury the anchor completely.

To choose the right anchor, match the anchor weight to the size of the boat. A small anchor should be  $\frac{1}{4}$  pound per foot, a medium anchor is 1 pound per foot and a large anchor is 2 pounds per foot.

## Types of Anchors

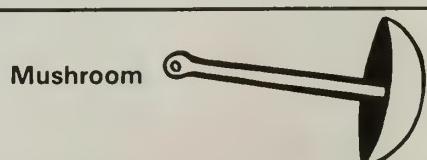


**Northill® and Danforth®**

These popular lightweight anchors are among the most popular. They hold well on most bottoms, once set properly.

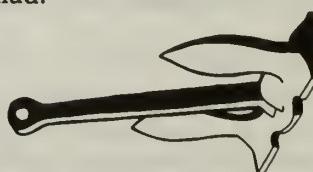


**Danforth®**



**Mushroom**

Often used for long-term moorage, this anchor works best in sand and mud.



**Stockless or Navy®**

The Navy® anchor is a heavyweight. It uses weight for its holding power. It is used primarily on large vessels.



# Chapter 18 KNOTS

A line is a rope that is being used on board. A boater doesn't throw the rope. In nautical terms, he heaves a line.

Lines protect people and boats and when used with care, can last for many years. In tying knots, "practice makes perfect."

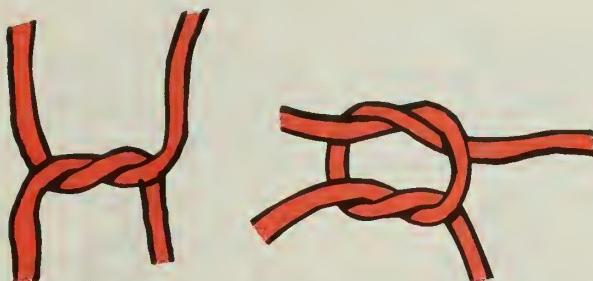
A boater uses five basic knots. Learn them well.

- Square Knot
- Bowline
- Anchor Bend
- Clove Hitch
- Half Hitch

These basic knots are used to:

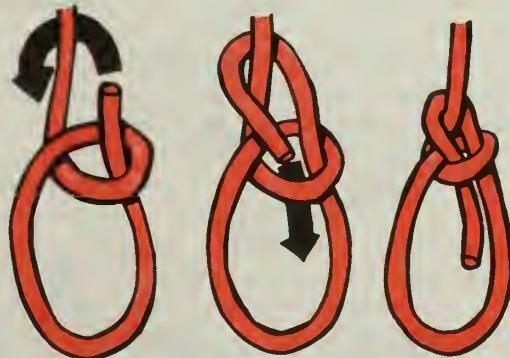
- Bend a line to a ring.
- Make a line fast to a piling or timber.
- Make a good secure loop.
- Make fast to a cleat.
- Fasten two lines together.

A boater who can tie a few firm knots well and depend on those knots to hold, is much safer than the person who tries many but cannot tie any.



Square Knot

Simple to make (so everyone says), the square knot is used for many applications for light duty work. The most common application is tying two light lines together.



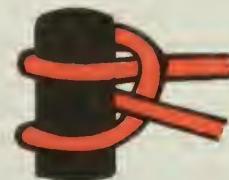
Bowline

Handiest of the knots, the bowline is probably the most difficult of those presented here. Use it whenever an eye or loop is needed. The bowline will neither slip nor jam.



Anchor Bend

The anchor bend is used to fasten a line to a ring or anchor. It is also called a fisherman's knot.



Clove Hitch

The clove hitch is simply two loops with an end tucked under. This knot is used to secure the boat to a piling or similar structure for a short stay. For securing longer than thirty minutes, use two half hitches to lock the clove hitch.



Half Hitches

## How to Tie to a Cleat

The knot below, when finished, is a figure 8 with one loop reversed. Note that by snubbing the free end back under, the knot can be released without disturbing the boat. Most boaters take a half dozen figure 8's before locking with the reverse; two or three will do.

Cleating



Never use a line too small for the boat. Leave a margin of safety.

Here are some basic rules to keep lines strong and safe:

- Keep them free from mud, dirt and grease.
- Keep them coiled and stowed in a dry place. This helps prevent kinks and rot.
- Stow them in a place where the air circulation is good.
- Don't drag or allow them to run against rough surfaces.
- Dry them with air, never near fires or in ovens. This will make them brittle.
- Reverse lines, end for end, each season.
- Inspect lines frequently. Replace worn or weak lines with new ones.



# Chapter 19 WATER SPORTS

## Water Skiing

The popular sport of water skiing should be a three person team activity to be done safely. State law requires at least two persons aboard a vessel towing a waterskier—the boat operator and an observer who is at least 12 years old. The observer watches the tow rope, the boat's wake and the skier's signals.

Do not water ski at night; it is only legal from one half hour before sunrise to one half hour after sunset.

In Massachusetts, any boat towing a waterskier must be equipped with a ladder, steps or similar device which can assist the skier in boarding the boat from the water. Also, an approved PFD must be on board for each passenger, including the skier.

The boat should start at a slow speed until the tow rope is tight. Check that the skier is wearing a PFD. Ski belts are not Coast Guard approved. Once the rope is tight and the skier is ready, be sure the way ahead is clear of traffic. When it is, apply enough power to raise the skier. Steer a course away from shore and danger spots and go directly into the water skiing area. When the skier is up and skiing, the power should be eased off as signaled by the skier.

The boat should not make sharp turns. This causes the skier to fight the wake of the boat. It is dangerous. Fast, sharp turns can also cause the skier to lose speed and sink. Each turn should be a large one, keeping the skier inside the wake of the boat.

Stay a safe and reasonable distance from all docks, swimmers, fishermen and danger areas. The tow rope should be at least 75 feet long. Keep the skier at least double that distance away from all potential hazards. This prevents accidents and serious injuries.

Give all other boats plenty of room. Maneuvering is difficult while towing. Use and obey the rules of the road with extra care and judgment.

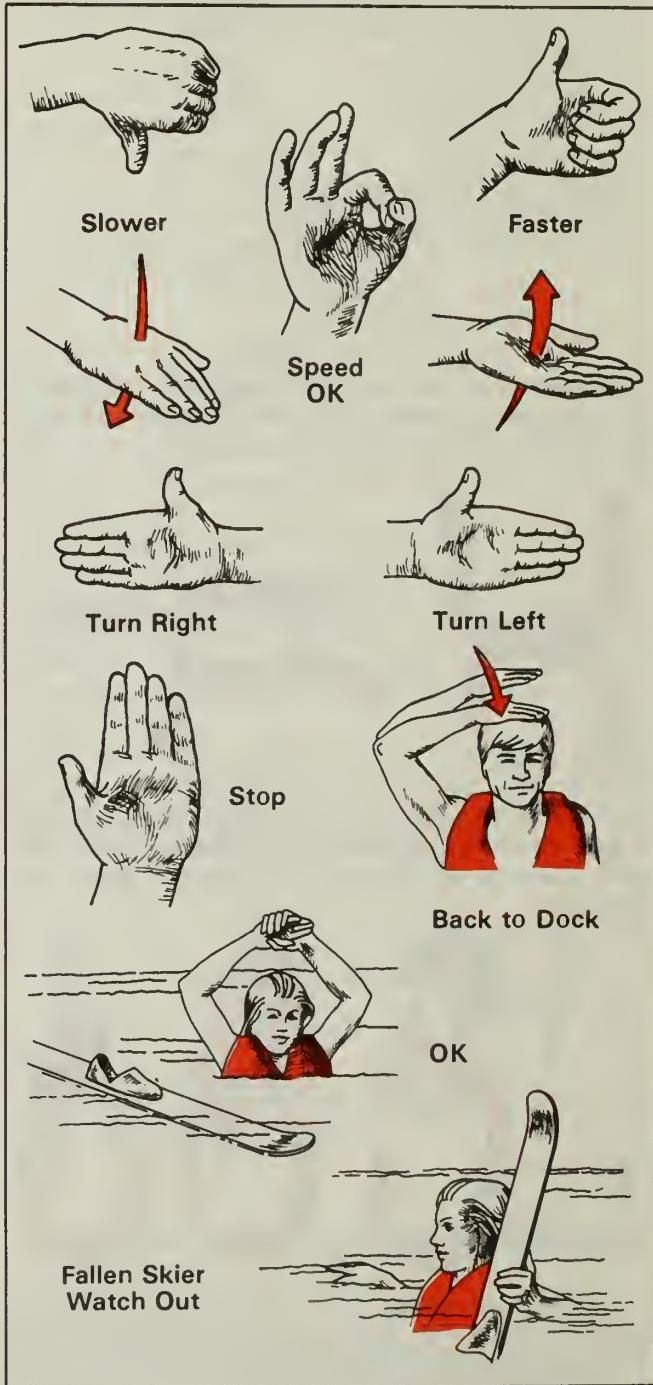
When a skier has fallen, circle slowly back and around. Don't pull the tow line in front of another boat. This will get the tow line to the skier who can use it to get up again or to board the boat. To bring a skier aboard, STOP the motor and bring the skier on board at the stern. Once the skier is aboard, retrieve the skis.

Water skiing is a sport. It takes skill, not showing off, to become a good skier. Horseplay is dangerous to the boat, the skier and anyone in the area. Showing off is the chief cause of accidents in what could be the safest water sport.

Give skiers a smooth, easy ride and let them signal what they want to do. They cannot operate the boat, but should always be able to control it. Skiers know how much they can and want to do. Do not try to think for them. Give them all the help possible.

Learn the basic water skiing signals below. Teach them to a skier before going out and the fun will double for every member of the team—driver, observer and skier.

### Water Skiing Signals \*



\* Recommended by the American Water Ski Association



# WATER SPORTS



**Alpha Flag**  
Internationally  
recognized  
diving flag;  
actual colors are  
blue and white.



## Diving

Boaters should be familiar with the "diver down" flag. Displayed on a boat or on a float, this flag indicates that diving activities are taking place. Divers should use the flag to mark diving locations and boat operators must be able to identify it. Serious injuries can result if proper caution is not observed. Be careful when approaching the "diver down" flag and follow these rules:

1. Do not approach out of curiosity.
2. On inside waters stay at least 100 feet away from the flag. In bays and open waters, stay at least 300 feet from the flag.
3. Keep a sharp lookout for air bubbles near the boat. The diver may have strayed from the safe area of the flag.

## Rowing

Most rowboats have given way to lowered transoms and outboard power but there is still a big place on the water for the boat powered by arm muscle and "ash breeze." (Most oars are made of wood from the ash tree.)

Seated with back to the bow and with the load of passengers distributed to balance the boat, the wise rowboat captain commands: "SIT DOWN!"

Keeping your weight low in any small boat is the first rule. Knowing how to handle the oars to provide smooth, even strokes and knowing how to drag the oar on the side you wish to turn to, can make rowing a graceful performance.

Making a poor "catch" with an oar, straining too hard and showing a lack of practice are faults easily noticed by even the occasional boat watcher.

Like all other boats, rowboats must be checked for leaking, and overloading. When an outboard motor is added to a rowboat be sure that it does not overpower the craft.

Adjustment of the angle of the outboard motor is critical on a small rowboat or dinghy. Kicking the

motor out with the transom lock and applying a burst of power can sink the stern.

With power added, the rowboat becomes a powerboat and must be numbered according to U.S. Coast Guard and state regulations.

With or without a motor, a rowboat is required to carry a PFD for each passenger. Wearing life jackets or vests makes good sense for everyone, especially the children, non-swimmers, and handicapped aboard.

Big boat wakes are a constant threat to the dinghy or rowboat operator. Simply keeping the bow into the oncoming wave is the best precaution against a sudden capsizing.

In the event of a dunking, rowboats follow the same rules as other boats: Stay with the boat. Rescuers can find you. It's the first place they'll look. Shore is always farther than it looks. Don't swim for shore.

## Canoeing and Kayaking

The first canoe may well have been a floating log paddled with pieces of driftwood. The craft of making canoes has passed from hollowing logs into dugouts, to stretching materials (animal hide, birch bark and canvas) over wood frames, to molding hulls of aluminum or fiberglass. Canoes are built to be lightweight and easy to handle.

Like canoes, kayaks are light and strong and glide easily through the water. Kayaks have closed decks with cockpit areas for one or two people. Most canoes have open decks and are built to hold one or several people depending upon the boat's design and length.

The modern kayak or canoe is a pleasure for the experienced boater, but it can be a disaster for the beginner who lacks proper instruction. The best way to begin is to take a canoe course, but, if you must learn by yourself, remember the basic safety rules:

- Stay out of a canoe if you don't know how to swim.
- Keep your weight low and centered at all times, especially when boarding.
- Sit still. If you must shift position, do it carefully, one person at a time, hands on the gunwales.
- Stay in protected waters, as close to shore as possible.
- Watch out for motorboat wakes! Ride them bow first or you'll capsize.
- Wear a PFD at all times. (Although not required to be worn, you must carry a PFD for each person aboard.)
- Practice paddling and steering techniques in shallow water. After you've had professional instruction in how to right an overturned canoe, practice capsizing, too.



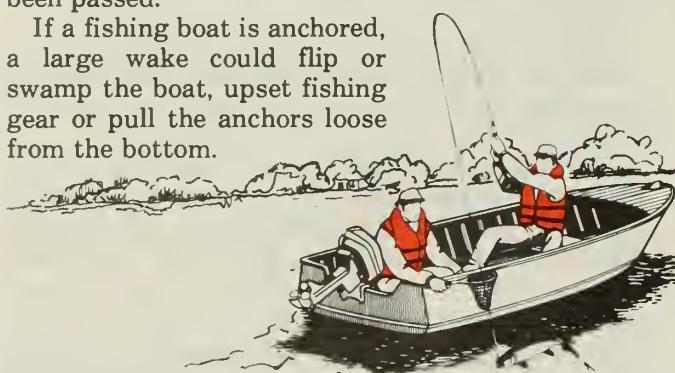
# WATER SPORTS

## Fishing

Most boaters fish from time to time. A motor makes it possible to fish in out-of-the-way places.

If cruising, steer clear of fishermen. They may have lines or nets out which might be cut if you come in too close. Slow down while approaching fishing boats. Don't return to cruising speed until the boats have been passed.

If a fishing boat is anchored, a large wake could flip or swamp the boat, upset fishing gear or pull the anchors loose from the bottom.



The law states that you are responsible for damage caused by your boat's wake. Keep your speed down and control your wake when passing other boats, swimmers or when landing.

When fishing from your boat, never anchor in shipping channels or tie up to navigation aids. These must be kept clear at all times.

## Hunting

As in fishing, falling overboard and capsizing in remote places are major potential hazards for hunters on the water.

Before starting out, check the weather. Line squalls occur most often during the fall hunting season. Judge the weight of your equipment to prevent overloading the boat. Carry one personal flotation device for each person in the boat.

Always remain seated while shooting from an open boat. This will improve both accuracy and stability. Know the gun's recoil so you won't be surprised or knocked over by the sudden movement. Never anchor from the stern.

If caught in rough weather, keep a low center of gravity by lying down. If an accident occurs, stay with the boat. Grab anything that floats to give you extra buoyancy. Do not remove extra clothing unless it hampers movement. Clothing will help preserve body heat and prevent hypothermia.

## Alcohol and Boating Don't Mix

While hunting or fishing, you need all of your concentration and patience to capture your prize. Too

much alcohol may cause you to come home empty-handed—or not at all. Alcohol is a depressant which dulls the brain and increases kidney function. Never stand up in a boat, even to relieve yourself. A sudden shift can put you overboard into cold water. Most people killed in boating accidents fall out of their boats and drown. These accidents happen most often in early spring or late fall when more people are fishing and hunting and the water is cold.

## Farm Ponds

Farm ponds have the same potential for accidents as large bodies of water.

Supervise children at play. Make sure each child can swim from the center of the pond to shore. A ring life buoy with a line attached should be on shore, ready to throw to someone in the water, if needed.

Locking boats to shore with a chain will prevent their being used without proper supervision. All boats should be properly equipped with a flotation device for each person on board.

## Swimming

Never swim alone from the boat. Swim near shore and away from boating channels. In heavy waves, it is almost impossible for a boater to spot a swimmer. No one would think of crawling into a busy street and staying there. A swimmer in a boating lane is doing just that.

A swimmer must be seen to be avoided. Even at medium cruising speed a boat approaches a swimmer much too fast to escape danger. Travel slowly in potentially hazardous areas. Here are some suggestions for avoiding swimmers:

- Continually watch the water ahead.
- Before making a turn, scan the water in the new direction.
- Avoid heading directly into the sun. Sun reflecting from the water surface can make it impossible to see objects in the water (and in some cases, other boats). Run alternately (first left then right) at an angle into the glare. "Tack" into the glare.
- Never run close to an anchored or drifting boat. Swimmers may be near or out of sight.
- Expect to find swimmers beyond marked swimming areas. Seeing one, expect more. Seeing none, proceed with caution.
- Don't be distracted by one hazard and fail to watch for others. A reckless boater could interrupt your scanning process and prevent your seeing a swimmer in the water.



# SKIPPER'S SCORE

1. When a boat is overloaded \_\_\_\_\_ decreases and the boat may be \_\_\_\_\_ by wakes or waves.
2. When leaving a dock the first thing to do is: (a) cast off the lines (b) start the motor.
3. When casting off and pulling away from a dock against the current, which line is cast off first:  
(a) Stern line                    (b) Bow line
4. When mooring a boat it is best to head into the \_\_\_\_\_ and the \_\_\_\_\_.
5. An anchor line should be \_\_\_\_\_ times the depth of the water anchored in.
6. An anchor should be: (a) thrown out (b) lowered over the side.
7. Name these five basic knots used in boating.



8. Name three safety rules for swimming.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

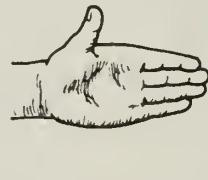
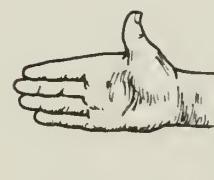
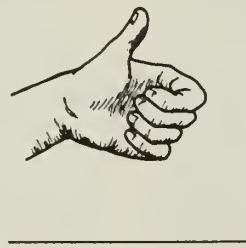
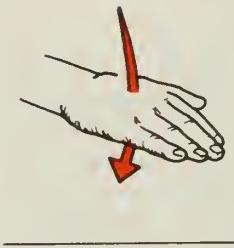
9. What should you do if you come upon fishermen while cruising? Why?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. Draw a picture of a "diver down" flag.



# SKIPPER'S SCORE

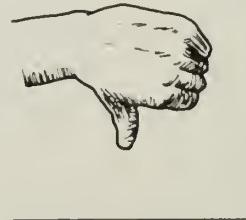
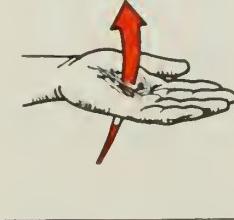
11. What is the minimum number of people needed to water ski? \_\_\_\_\_
12. What is the job of an observer in water skiing? \_\_\_\_\_  
\_\_\_\_\_
13. What should you do if the skier you are towing falls into the water? \_\_\_\_\_  
\_\_\_\_\_
14. When a motor is added to a rowboat it becomes a \_\_\_\_\_ and must be  
\_\_\_\_\_ according to Coast Guard regulation.
15. What should you do if your boat capsizes? \_\_\_\_\_  
\_\_\_\_\_
16. Identify the following water skiing signals.



\_\_\_\_\_

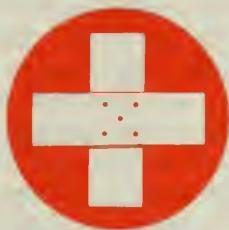


\_\_\_\_\_





## EMERGENCY MEASURES



### XX. Chapter 20—Accidents

- A. Causes of accidents
- B. Person overboard
- C. Assistance and rescue
- D. Survival in the water
- E. Visual Distress Signals
- F. Accident reporting

### XXI. Chapter 21—Fire on Board

- A. Fueling
- B. Fire prevention
- C. The fire triangle
- D. Fire fighting
- E. Carbon monoxide poisoning

### XXII. Chapter 22—First Aid

- A. First aid courses
- B. Mouth-to-mouth resuscitation-procedure
- C. Injuries
- D. Shock
- E. Bleeding
- F. Burns
- G. Broken bones
- H. Bugs
- I. Hypothermia

### XXIII. Chapter 23—Maintenance

- A. Maintenance is an important safety habit
- B. Examine hull carefully
- C. Clean sails and examine for wear
- D. Motor requires careful attention
- E. Emergency repairs

### XXIV. Chapter 24—Courtesy

- A. Keep noise to a minimum
- B. Remove litter
- C. Watch your wake

### XXV. Chapter 25—Security

- A. "Lock it or lose it"
- B. Paint boat's name on hull or transom
- C. Keep extra equipment out of sight

### XXVI. Chapter 26—Storage

- A. Mildew and rot
- B. Trailer wheel bearings and tires
- C. Condensation
- D. Mooring



# A SKIPPER'S TALE

## A Memorable Fourth of July

Mike and Julie Baxter and their three small children had just spent a pleasant fourth of July visiting friends who had a cabin on the island. They had tied up their new 22-foot I-O day cruiser at the north part of the bay and spent the warm sunny day exploring the island.

The chilly breeze reminded the Baxters it was getting late. It would be dark before they reached the mainland. Although Mike Baxter was a very capable skipper (he had spent the last 25 of his 35 years behind the wheel during the summer), he did not like to navigate his boat at night with his family aboard.

So the family gathered their belongings and climbed into their boat. It was nine o'clock as the Baxters headed out. The skies were still clear, but the water was getting choppy as the evening breeze blew across the lake.

To be on the safe side, Julie went below to get the life preservers for everybody. She brought up three

child-sized and two adult-sized vests. Everybody put them on snugly and found a secure spot to sit.

The lights winked at them from the marina. It had been a beautiful day. As the children dozed, Mike realized that he too, was feeling the effects of sun and water. He was tired and anxious to get home.

They passed a "Slow-No Wake" area at full speed before Mike realized they were entering the marina. Suddenly a 16-foot aluminum fishing boat appeared from starboard, traveling without lights. Before Mike could react, they had hit the boat broadside.

The fishing boat capsized and began filling with water. Julie threw their life ring overboard. Fortunately, the lone fisherman was also wearing a personal flotation device (PFD). They quickly spotted him in the water, stopped their engine and hauled him on board over the stern. Fearing hypothermia, Julie brought up some blankets to warm the fisherman.

Mike checked to make sure their fiberglass hull wasn't damaged and put a tow line on the half-submerged boats before proceeding to shore to report the accident.

## Running Aground

If you operate in any area where the water level is subject to change, there is a chance you might run aground. As in all emergency situations the first thing to do is keep calm. Usually, the first impulse is to shift immediately into reverse, gun the engine, and attempt to back up. This could be the wrong move. If you run aground on sand or mud, the propeller spinning in reverse may pull more sand and mud under the keel making matters worse. Moreover, if there are shells present, you will probably damage your engine.

Instead, tilt up your motor. With an oar, paddle or boat hook test the bottom all around the boat. If the bottom is shallow and sandy and it is safe to do so, get

a couple of people out of the boat and push it off. You might get results by having your passengers move and shift their weight.

If you've run up on a rock or something solid, check to see if the hull has been ruptured before you try to back off. It might be wiser to keep the boat on the rock until you are ready to stuff something into the hole. A PFD, mattress, or blanket jammed into the hole may help long enough to get to shore. If the hole is too big, get all passengers on board into PFD's and stay with the boat. It's not going to sink right away if at all.

There is extra flotation in most boats and you and your passengers can hang on until help arrives.



# Chapter 20 ACCIDENTS

Accidents can happen whenever you're afloat and usually occur without warning. Never stand up in a small boat when cruising, fishing or starting the motor. It only leads to trouble. Remember, riding on decks or gunwales is unwise and in some states illegal. A quick stop or turn may toss a person overboard into the propeller. Always decrease speed gradually when stopping a boat with a low transom. The wake may swamp the boat.

Accidents often occur because a basic safety rule is ignored or broken. Common accident causes are:

1. Engine too big or too heavy
2. Overloading
3. Riding on decks or gunwales
4. Damage from wakes
5. Operating in a reckless manner
6. Operating under the influence of drugs or alcohol
7. Explosion and fire during fueling
8. Gasoline leaks or spills

Small open boats are involved in more accidents which result in fatalities than any other type of

watercraft. Usual causes of these accidents are:

1. Taking the boat into waters which are beyond its capability.
2. Overloading the boat with passengers and equipment.
3. Inexperienced boaters operating in unsafe waters.
4. Passengers standing up and falling overboard.

An overloaded boat loses buoyancy and stability. The boat then capsizes easily. Sometimes the wake of a passing boat or a passenger's sudden movement is enough to capsize an overloaded boat. *A boat that is overloaded is a dangerous boat.*

Should the boat capsize, grab a lifesaving device. Swim to the boat and hold on. Do not try to swim to shore. It is usually farther than it looks. And, it is easier to spot an overturned boat than a swimmer. As a general rule, wear a personal flotation device and stay with the boat until help comes.

If a boat in distress is encountered while underway, offer aid. However, do not interfere with rescue operations by others with better knowledge or equipment.

## Causes of Accidents



Engine Too Big or Too Heavy

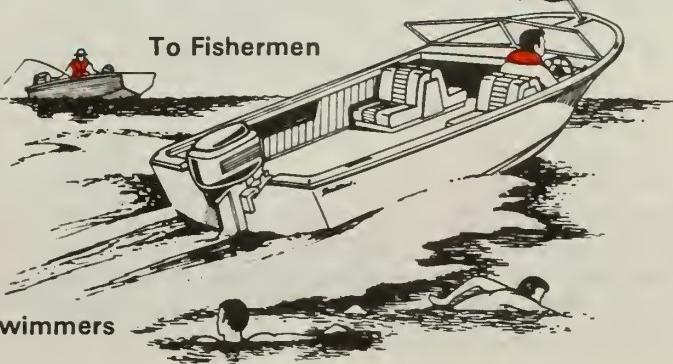


Operating in a  
Reckless Manner



Overloading

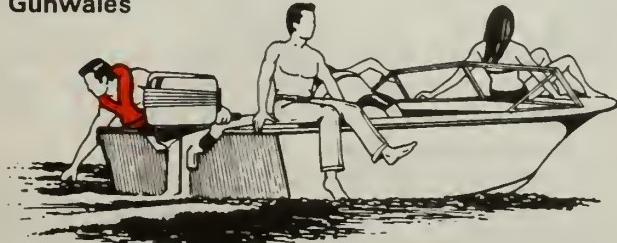
Damage from  
Wakes



To Fishermen

To Swimmers

Riding on Decks  
or Gunwales



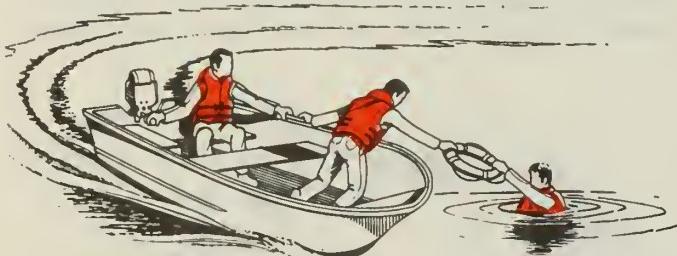


# ACCIDENTS

## Person Overboard

If someone falls overboard, follow these procedures:

1. Toss a life saving device...even if the person can swim. A life ring is the preferred device. It can be thrown farther and is easier to hang on to. However, use whatever device is nearest. Time is essential.
2. Slow the boat, keeping the person in view. Other persons onboard should act as lookouts. At night, direct the best possible light source on the victim.
3. Try to approach the person from downwind or into the waves. Always use common sense and good judgement. Consider existing conditions such as water temperature, physical condition and ability of the victim and what other help is available. If someone aboard is capable, have the person put on a life saving device with a line attached to the boat and enter the water to assist the person needing help.



4. Always stop the motor when someone is going over the side or coming aboard.
5. Depending on the size and construction of the boat, the person should be brought in over the stern.
6. Assist the person in boarding the boat. It is difficult to climb into a boat from the water. The person may be hurt or cold and may require help.

## Assistance and Rescue

When helping others, remember:

1. Always be ready to help if possible.
2. Help save lives, but never risk lives to save equipment.
3. Never take unnecessary chances.
4. Don't panic.

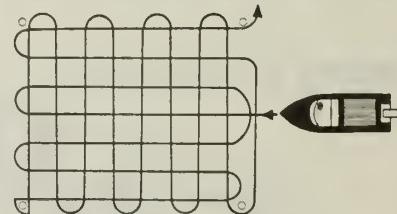
Get lifesaving devices ready. Approach the accident cautiously. Watch for people in the water. Toss lifesaving devices to those who do not have them. Give help first to anyone who seems to be having trouble. Talk to the people in the water. They can tell you if they are all right.

To get a person out of the water, approach slowly and stop the motor when alongside. Try to bring the person in over the stern. Balance the boat so it does not roll too much when people crawl aboard. Do not overload the boat.



If there are more people requiring help than the boat will safely hold, bring aboard those most in need of help. Be sure all others have adequate life saving devices. Heave a line to the others and secure it to the stern cleat. This will allow them to be towed slowly to shore and will also prevent an overloading situation.

Typical  
Search and  
Recovery  
Pattern



## Survival in the Water

You may fall overboard or be forced into the water from a boating accident. Don't panic or fight the water. Swim slowly and easily to conserve strength. Hang onto the boat unless it is in danger.

Any item that floats will help keep you afloat. In a fire or explosion, throw anything that floats overboard. Tie a rope to the floating gear to hold on to. If the boat is on fire you can then float a safe distance away and not lose the boat. Floating debris is easier to see than one person in the water.

Clothing can preserve body heat and help you float. Take it off only if it hampers movement. Fasten clothing around your neck to trap air. Keep your arms under water. If wearing trousers, bend your legs to hold the air in around your knees. Hunters and fishermen can use the air which is trapped in their boots to keep them afloat.

You may begin to lose body heat through hypothermia (See page 72). If you are exhausted or losing consciousness, tie yourself to anything that floats.



# ACCIDENTS

## Visual Distress Signals

To ensure that boaters in distress are rescued promptly, the U.S. Coast Guard requires all boats operating in U.S. coastal waters to carry visual distress signals. Coastal waters include the Great Lakes, the oceans, and any bay or sound that empties into the ocean. In addition, a river that has a mouth over two miles across is considered to be coastal waters from the mouth to a point where it narrows to two miles. Rivers, streams and inland lakes, except the Great Lakes, are not considered to be coastal waters.

The chart below shows the various signalling devices currently approved and indicates if they can be used during the day, at night, or both. Boats 16 feet or longer in length must carry three daytime signals and three nighttime signals. However, three signals suitable for both day or night use may be substituted if desired. Boats under 16 feet in length must carry three nighttime signals. They are not required to carry signals in the daytime.

Some skippers do not like to carry pyrotechnics (flares) aboard their boats. Accordingly, one orange distress flag may be substituted for the three daytime signals and one SOS distress light may be substituted for three nighttime signals.

All visual distress signals carried in accordance with these regulations must be approved or certified by the U.S. Coast Guard. Signals must be in good condition (the service date must not have expired), and kept where they are readily accessible.

There are exceptions for certain boats during daytime. The following only need to carry night signalling devices when operated at night:

1. Recreational boats less than 16 feet in length.
2. Manually propelled boats (rowboats, canoes, kayaks).
3. Open sailboats under 26 feet long, with no motors attached.
4. Boats participating in organized marine events.

## Accident Reports

The operator of a vessel involved in a collision, accident or other casualty, shall render all practical and necessary assistance to persons affected by the collision, accident or casualty if it can be done without serious danger to their own vessel.

The operator must also give their name, address and vessel identification to any person injured or to the owner of any property damaged in the accident.

A written report is required to be submitted within 48 hours to be Division if the accident results in loss of life. The report is the responsibility of the operator.

A written report is required to be submitted within five days to the Division if the accident results in:

1. injury, requiring medical attention.
2. property damage in excess of \$100.
3. loss of consciousness.
4. disability in excess of 24 hours.
5. disappearance of any person from on board a vessel under circumstances which suggest any possibility of death or injury.

**Chart of Visual Distress Signals** Required by federal law on coastal waters only.

<b>Orange Flag</b>	<b>Red Distress Flare (Hand)*</b>	<b>Electric Distress Light</b>
<b>Use Day Only</b>	<b>Use Day and Night</b>	<b>Use Night Only</b>
<b>Red Parachute Flare (Hand or Pistol)**</b>	<b>Orange Smoke Signal (Hand)</b>	<b>Orange Smoke Signal (Floating)</b>
<b>Use Day and Night</b>	<b>Use Day Only</b>	<b>Use Day Only</b>
<b>Red Meteor***</b>	<b>Red Meteor***</b>	
<b>Use Day and Night</b>	<b>Use Day and Night</b>	

\*must have a manufacture date of October 1, 1980, or later

\*\*requires approved pistol launcher

\*\*\*some may require approved launcher



# **SKIPPER'S SCORE**

1. What are the seven most common causes of boating accidents? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. An overloaded boat is a \_\_\_\_\_ boat.
3. If you see another boat in trouble you should \_\_\_\_\_.
4. If a boat is in trouble but is being aided by another boat better equipped than yours you should \_\_\_\_\_.  
\_\_\_\_\_
5. What are some things you can do to help people who are in the water following a boating accident?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. What is the first thing you should do if a person falls off your motorboat? \_\_\_\_\_  
\_\_\_\_\_
7. Number these statements in the order you would follow in the event of a person overboard from your motorboat.
  - \_\_\_\_\_ Stop the motor.
  - \_\_\_\_\_ Bring the person aboard over the stern.
  - \_\_\_\_\_ Throw the person a lifesaving device.
  - \_\_\_\_\_ Assist the person in boarding the boat.
  - \_\_\_\_\_ Slow the boat.
  - \_\_\_\_\_ Approach the person slowly from downwind or into the waves.
8. How many distress signals can you list? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
9. Who is responsible for reporting a boating accident? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
10. If you run aground, you should shift into reverse and gun the engine. (a) True (b) false
11. If forced into the water from a boating accident, you should: (a) swim to nearest shore (b) stay with the boat unless it's in danger.
12. When in the water, clothing can preserve \_\_\_\_\_ and help prevent \_\_\_\_\_.  
\_\_\_\_\_.



# Chapter 21 FIRE on BOARD

## Fueling

Always exercise extreme caution when fueling a boat. Remember, gasoline vapors can be more explosive than dynamite. Since gasoline vapor is heavier than air, it may settle in the bilge. Even a spark may trigger an explosion.

Most boat fires occur just after refueling. They are caused by improper design, poor maintenance or carelessness. Common sense can prevent most fires.

Check the entire fuel system for leaks. Tighten connections frequently. Motor vibrations and rough weather loosen them.

Prepare outboard gas and oil mixtures on the dock when possible. Pour gasoline and oil into a separate container and shake well. Then strain into the tank with a strainer/funnel. Grit, water and dirt can ruin a motor. Do not fill the tank completely. Allow for expansion. Store extra gasoline on board in a separate safety-approved auxiliary tank. Be sure that the tank has a good air supply. Keep the tank away from the boat's motor and batteries.

1. Always remove portable tanks from the boat for refueling.
2. Shut off motors that could make a spark or heat. Turn off electrical equipment and liquid propane gas tanks.
3. Close all windows, doors and openings before fueling. Overcome the natural tendency to leave everything open. Closing all compartments prevents vapors from seeping into the boat.
4. Try to fuel before night. If light is needed, use a flashlight or a light that is sparkproof.
5. Never smoke when fueling or near a fueling dock. Check tobacco that might be smoldering.
6. When filling from a gas can, touch the fuel pipe or tank with the spout while pouring. This prevents a build-up of static electricity which could produce a spark.
7. When fueling from a pump, keep the nozzle in contact with the tank.
8. After fueling, wipe up all spilled gasoline. Air the rag after using. Never throw it into the boat or the water. If it must be stored, seal it in a tightly covered metal container.
9. Gasoline vapors must be drawn or forced out of low pockets in the bilge. Open all doors, windows, ports and hatches. Let the air blow

through for at least five minutes. Use only explosion-proof fans with spark-proof switches to clear the area of fumes.

10. Check all lines and connections again for leaks. Sniff around gas lines, motor and bilges. When vapors are gone, start the motor.

## Fire Prevention

Fire aboard a boat can be terrifying. A person may have only a split second to act. The importance of having fully charged fire extinguishers on hand cannot be overemphasized.

Most fires can be prevented. Clean bilges often and maintain proper gear stowage at all times. Whenever a condition may contribute to a fire, correct it at once. While these precautions do not guarantee that a fire will never start, they greatly reduce the possibility.

## The Fire Triangle



Fuel, heat, and oxygen are necessary for fire to exist. Eliminate any one of them and the fire will go out. Fires are usually extinguished by cooling, smothering, or both. Most U.S. Coast Guard approved fire extinguishers are designed to smother fires. For oil and grease fires, direct these agents at the base of the fire.

Never use water on a gasoline, oil, grease, or electrical fire. Water will spread a gasoline fire and since water is a conductor, you may receive a damaging shock from an electrical fire. Water can be used to extinguish burning wood, mattresses, rags, rubbish and alcohol.



# FIRE on BOARD

Even if a fire appears to be out, it may smolder for a long while and start up again. If possible, soak burning materials over the downwind side of the boat. When the emergency is over, retrieve them to avoid littering the waters.

Follow these steps if fire breaks out underway:

1. Slow or stop the boat. Wind from the boat's motion fans the flames.
2. Keep the fire downwind. If the fire is aft, head the bow into the wind. If forward, put the stern into the wind.
3. If the motor catches fire, shut off the fuel supply immediately.
4. Put out distress signal.

These actions help prevent the fire from spreading to other parts of the boat.

Before fire breaks out, plan ahead. Decide what should be done to combat a fire in any part of the boat.

Most boat fires can be put out rapidly if you act immediately. Don't hesitate! If a fire starts, grab the extinguisher, activate it and direct it at the base of the flames. Use short bursts and sweep it from side to side. Don't wait until a fire starts to read the directions on the label. Know these in advance.

Many boats have burned all the way to the water line because the people panicked and jumped overboard. They could have put out the fire if they had used a marine fire extinguisher.

## Carbon Monoxide Poisoning

Carbon monoxide gas is a by-product of internal combustion engines and is usually found in the exhaust gas. It may also be produced by catalytic heaters, charcoal, gas lanterns and gas stoves. Know the symptoms, be able to recognize them and know the procedures to follow to treat carbon monoxide poisoning.

Carbon monoxide is odorless and tasteless. It is extremely toxic in small quantities. Symptoms are dizziness, ringing in the ears, headache, nausea, loss of motion and unconsciousness.

Should anyone show these symptoms, get the victim in fresh air. If necessary, apply mouth to mouth resuscitation. Get medical help as quickly as possible. Do not confuse the symptoms with sea sickness.

The best precautions are to keep plenty of air flowing through the boat. Be careful when running downwind, exhaust gases may blow back aboard.

If using a catalytic heater for warmth, be sure to use only with adequate ventilation. Do not leave the heater burning through the night.

## Fire Extinguisher Classification

Study the table below. If you operate a motorboat, you are required by Coast Guard and state regulations to have fire extinguishers aboard, depending on the class (or length) of your motorboat.

NOTE: In Massachusetts, boats under 26 feet long are exempted from carrying fire extinguishers if they are of open construction. Open construction means decked over for less than a quarter of the boat's length and with no enclosed gasoline tanks or bilges or other places where explosive gases can accumulate. In all cases, boats carrying passengers for hire must be equipped with fire extinguishers.

### Minimum Number of B-I Hand Portable Fire Extinguishers Required\*

EQUIPMENT	CLASS A (Less than 16 ft.) (Less than 4.9 m.)	CLASS 1 (16 to less than 26 ft.) (4.9 to less than 7.9 m.)	CLASS 2 (26 to less than 40 ft.) (7.9 to less than 12.2 m.)	CLASS 3 (40 to not more than 65 ft.) (12.2 to not more than 19.8 m.)
When no fixed fire extinguishing system is in machinery space.	1	1	2	3
When fixed fire, extinguishing system is in machinery space.	0	0	1	2

\*One B-II hand portable fire extinguisher may be substituted for two B-I hand portable fire extinguishers.

# Chapter 22 FIRST AID

## First Aid Courses

Learn as much about good boating and safety afloat as possible. Take an approved first aid course from the American Red Cross, Civil Defense or other organization. Equip the boat with a first aid kit. Include supplies to handle minor accidents and the information needed to use these supplies properly. Remember, the first duty of a skipper is the safety of passengers, crew and boat.

## Mouth-to-Mouth Resuscitation

Mouth-to-mouth resuscitation is an effective method of artificial respiration, used to restore life or consciousness to a person who has stopped breathing as a result of:

- |  |   |
|--|---|
| <input type="checkbox"/> Drowning          | <input type="checkbox"/> Poisoning                        |
| <input type="checkbox"/> Smothering        | <input type="checkbox"/> Chest Injuries                   |
| <input type="checkbox"/> Electric Shock    | <input type="checkbox"/> Shock                            |
| <input type="checkbox"/> Smoke Suffocation | <input type="checkbox"/> Head Injuries                    |
| <input type="checkbox"/> Heart Attack      | <input type="checkbox"/> Foreign Objects<br>in the Throat |
| <input type="checkbox"/> Stroke            | <input type="checkbox"/> Gas Poisoning                    |

During artificial respiration, air is forced into the lungs through the mouth or nose to help revive normal breathing functions. The treatment is not harmful and the air blown into a victim's lungs can save his life.

A person who is not breathing is not always dead. If the victim's lips, tongue, and nails have turned blue, air is needed. Start mouth-to-mouth resuscitation *immediately!* Don't waste time moving the person to shore or going for help. Time is of prime importance and seconds count.

The following procedures should be used to administer mouth-to-mouth resuscitation to a person who has stopped breathing.

Lay the victim in a face up position and tilt the person's head backward so the chin is pointing upward (Fig. 1). Holding the person with a hand under the neck, pull the jaw forward and pinch the nose shut. Take a deep breath, place your mouth tightly around the victim's mouth and blow air into the person's mouth (Fig. 2). Start with four quick breaths. This first blowing effort should indicate whether or not the victim has any obstructions.



Fig. 1



Fig. 2

If air goes in, stop and check for the pulse at the side of the neck for five seconds (Fig. 3). If there is no breathing and no pulse, this means the heart has stopped. Begin Cardiopulmonary Resuscitation (CPR) if you have been trained. If the victim has a pulse but is not breathing, begin breathing for the person by means of mouth-to-mouth resuscitation. For adults, blow once every five seconds—about as often as you breathe normally.

Watch for the chest to rise. When it rises, stop blowing. Listen for the air to be exhaled and see that the chest falls (Fig. 4). Repeat the blowing cycle until the person begins breathing.



Fig. 3



Fig. 4

In the case of the drowning victim, water may come out of the lungs between breaths. Getting air into the lungs is more important than draining the lungs.

On infants and small children, cover both the mouth and nose with your mouth. Blow shallow breaths once every three seconds.

If during the first blowing effort you are unable to breathe for the victim by forcing air into the lungs, the person's airway is blocked. Check for foreign objects in the mouth and turn the victim on his side. Strike between the shoulder blades four times. Then, roll the person on his back and give four thrusts by placing the heel of one hand between the rib cage and the navel and thrusting up towards the head. Again check for foreign matter in the mouth and try mouth-to-mouth resuscitation right away. Repeat the entire cycle until the person is breathing again.

If the victim is a child, hold him up by his ankles. Slap him hard between the shoulder blades to loosen the object. Then clear his throat and start mouth-to-mouth resuscitation again.

If the victim is conscious and choking, bend him over and give him four back slaps between the shoulder blades. The head should be hanging lower than the chest. If unsuccessful, stand behind the victim and wrap your arms around his waist. Make a fist with one hand, clasp it with the other hand and press into the victim's abdomen (just below the rib cage) with four quick upward thrusts. Repeat the sequence of four back slaps and four thrusts until the person starts breathing.



# FIRST AID

## Injuries

The most common injuries requiring first aid are burns, serious bleeding, broken bones, drowning and shock.

First aid may be required while the injured person is being taken back to shore for professional help.

## Shock

Shock can cause death if not treated promptly, even though the injury itself may not be serious enough to cause death. Any person with a serious injury should be treated for shock even though shock symptoms have not appeared.

## Bleeding

Most bleeding can be controlled by applying a pad of clean cloth directly over the wound. For more serious bleeding, a large cloth should be applied and bandaged into place. Make sure it is not too tight.

If a limb is injured and the blood is bright red and spurting, pressure is needed on the supplying arteries. The pressure points are on the inner side of the arm midway between the shoulder and elbow, and on the upper leg at the center of the angle where the leg joins the body. While direct pressure is being applied, the injured limb should be elevated.

## Burns

A burn is a serious, painful injury and should be treated carefully. The objectives of first aid are to prevent infection, relieve pain and treat for shock.

There are three degrees of burns. First degree burns redden the skin, second degree burns form blisters, and third degree burns char or destroy tissue.

## Broken Bones

If a person breaks a bone while aboard, keep the broken limb from moving. Stop the bleeding (if any), treat for shock, and seek medical treatment.

## Bugs

There are many types of bugs, but you don't need to let them bite. Stock up on bug repellent and use plenty, especially in the evening or early morning hours. Be sure to carry a good insect repellent on your trip. Put out netting before going to bed. You'll sleep more soundly.

## Hypothermia

*Hypothermia* is a condition in which the body loses heat faster than it can produce it. This causes a dangerous reduction of the body's inner temperature.

Hypothermia results from exposure to wind and wetness. A victim of hypothermia may become blue-

gray in color. Violent shivering develops which may give way to muscle spasms and even loss of the use of arms and legs. Confusion and drunken behavior also indicate that a person may be hypothermic.

To protect yourself from hypothermia, avoid the conditions that cause it. Dress warmly and stay dry. Put on raingear before it rains and wear a wool jacket. Wool traps body heat even when wet. Know the effects which wind has on cold weather. It may be 40°F (7°C) outside with the sun shining, but a 10 mph wind lowers the temperature to 28°F (-2°C), a 20 mph wind lowers it to 18°F (-7°C).

Hypothermia Chart

If the Water Temp. (F) is ...	Exhaustion or Unconsciousness	Expected Time of Survival is ...
32.5	Under 15 Min.	Under 15-45 Min.
32.5-40.0	15-30 Min.	30-90 Min.
40-50	30-60 Min.	1-3 Hr.
50-60	1-2 Hr.	1-6 Hr.
60-70	2-7 Hr.	2-40 Hr.
70-80	3-12 Hr.	3-Indefinitely
over 80	Indefinitely	

When a person falls into cold water, life expectancy is greatly reduced. But there are ways to increase the chances of survival. Don't discard clothing, it helps trap the body's heat. Don't exercise. Thrashing around in cold water only leads to exhaustion and swirling water takes heat from the body more rapidly than still water.



Group Huddle

Self-huddle position or H.E.L.P.  
(heat escape lessening posture)





# FIRST AID

A PFD will help for two reasons: it lessens the need to move around in the water and it helps insulate against heat loss. When wearing a PFD, a person should draw his knees to his chest and wrap his arms around his legs in what is called the self-huddle. If there are several people in the water, huddling together with arms around each other's shoulders is the best survival technique.

Treatment for hypothermia involves getting heat back into the body and raising the inner temperature.

Warm, moist towels may be applied to the head and body of the victim. Hot water bottles inside a blanket is another good technique. A hot bath is fine for mild cases but never if the victim is unconscious. Skin-to-skin contact and mouth-to-mouth resuscitation (even when the victim is conscious) are excellent ways to transfer heat.

Do not give alcohol or massage a person vigorously to treat hypothermia.

**50/50 RULE:** If the water temperature is 50°F or less, you have a 50/50 chance of living for 50 minutes!

## Emergency Measures

INJURY	SIGNS	TREATMENT
Broken Bones	Pain, tenderness, deformity and possible bleeding.	Keep broken bone ends and adjacent joints from moving; control bleeding, treat for shock
Burns	DEGREE: 1st—Skin is red. 2nd—Skin is blistered. 3rd—Skin is charred.	Pain of 1st degree and small 2nd degree burns can be relieved by excluding air. Three ways to exclude air from 1st or 2nd degree burns are: 1.) Submerge in cold water; 2.) Apply a cold pack; 3.) Cover with a thick dressing or unused plastic. For a 3rd degree burn, cover with dry clean cloth and call for medical help. If the victim's face is burned, he may stop breathing. Be ready to give artificial respiration.
Heart Failure Epilepsy	Victim is ill with no apparent external injury. Clutching chest, extreme shortness of breath, convulsions.	Place the victim in a comfortable position, usually sitting up. Call for medical help and give prescribed heart medicine if available. If not breathing, give artificial respiration. Victims with convulsions should be laid down in a cleared, open area. Never place anything in the person's mouth.
Objects in eyes, ears and nose	Local irritation, tearing and wetting.	Eye: Don't rub. Lift particles out with corner of clean handkerchief. If unsuccessful or if the particle is embedded, cover both eyes and get medical attention. Ear and nose: Get medical attention, don't try to remove.
Poisoning	Blurred vision, stomach cramps, vomiting, headaches, convulsions or deep sleep.	Save label of poison container for I.D. and call emergency help. If victim is conscious, dilute the poison with milk or water. Do not neutralize with counteragents or give oils. If victim is unconscious, do not give fluids.
Shock	Pale, clammy skin, irregular breathing, fast, weak, pulse.	Keep person lying down and maintain normal body temperature (98.6). Do not give fluids if victim is unconscious.
Sunburn	Red, painful skin and chills. Fever and shock occasionally accompany severe sunburns.	Apply cold water. Do not re-expose burned area to sun until completely healed. Get medical attention.
Unconsciousness	Victim is not awake, does not respond to external stimuli.	Treat for shock. Turn head to side in case of vomiting. Get medical attention. Stand by to give artificial respiration if breathing stops. Never give liquids or foods to an unconscious person.



# **SKIPPER'S SCORE**

1. Gasoline vapors can be more explosive than\_\_\_\_\_.
2. Most fires aboard a boat occur just after\_\_\_\_\_.
3. Where should you prepare outboard gas and oil mixtures?\_\_\_\_\_
4. Boat windows, doors and other openings should be: (a) open (b) shut during refueling.
5. If you must fuel at night what kind of light should be used?\_\_\_\_\_
6. Fire extinguishers aboard a boat must be kept\_\_\_\_\_.
7. What are some things you can do to protect your boat against fire?  
\_\_\_\_\_  
\_\_\_\_\_
8. Though carbon monoxide is\_\_\_\_\_and\_\_\_\_\_, it is extremely  
(or poisonous) in small quantities.
9. A person showing signs of carbon monoxide poisoning should first be\_\_\_\_\_.
10. Name five conditions for which you might administer mouth-to-mouth resuscitation:  
\_\_\_\_\_
11. A person receiving mouth-to-mouth resuscitation should be lying\_\_\_\_\_.
12. Number these procedures as they should be followed for mouth-to-mouth resuscitation:  
 Clear the mouth of foreign matter or other obstruction.  
 Pinch nostrils to prevent leakage of air.  
 Place victim on back.
13. What is the first thing you should do if you suspect that a person has been poisoned?  
\_\_\_\_\_
14. How can you tell if a person is in shock?  
\_\_\_\_\_
15. Never give an unconscious person\_\_\_\_\_or\_\_\_\_\_.
16. What is the most common cause of boat fires?  
\_\_\_\_\_
17. When should mouth-to-mouth resuscitation be used?  
\_\_\_\_\_
18. What is the first thing you should do if your boat is leaking?  
\_\_\_\_\_



# Chapter 23 MAINTENANCE

## Preventative Maintenance

Maintaining your vessel in good working condition is an important safety habit. The hull should be examined thoroughly whenever the boat is out of the water. If the hull is aluminum a common problem is oxidation. Oxidation appears as white, powdery spots. Sand the area with fine sand paper until the metal is bright. Then apply alodine, a yellow chemical which stops the oxidation process. Fiberglass hulls should be washed with fresh water and a detergent to remove oil stains and algae. Be careful when using abrasives to avoid damaging the gel coat (the shiny top layer). If necessary, patch hulls with fiberglass patching compound. Wooden hulls should be cleaned with detergent and a soft bristle brush; re-caulk if necessary. Store canoe hulls out of the sun, in an inverted position if possible.

A sailboat's sails, ropes and lines should start each season clean. Small particles of dirt and sand will cause wear quickly, especially since this equipment is in constant use. Synthetic sails can take a mild scrubbing with detergent and a soft brush. Examine sails for open seams or small tears. These may be repaired by press-on tape or by sewing. Old lines should be downgraded in their use. Synthetic lines should never be left in the sun.

Marinas can be far apart and a breakdown could leave you stranded for a long time, so keep the engine well tuned. Check the oil level each time you set out. The owner's manual will indicate how often the oil should be changed but it is generally after every 50-100 operating hours. Check the battery level; have it recharged if necessary. See that the terminal connections are clean and free of corrosion. The exterior

of the engine should be kept as clean as possible, since grease and oil are fire hazards. Generally check hoses, loose nuts or bolts, screws or anything else which must be tightened, repaired or replaced.

## Emergency Repairs

Proper care and maintenance reduce the chance of a breakdown. But it can still happen. Many emergency repairs can be made with materials on the boat. A few basic hand tools and spare parts are a must for any boat. Wrenches, screwdrivers, a hammer and vice-grips are enough to tackle most problems. Spare points and plugs, fuel pump, fuel filter (for diesel engines) and drive belts should also be kept on board for emergencies.

- Basic Checks**—If your engine fails, make these three basic checks before taking it all apart or calling for help: (1) fuel tank is not empty, (2) not aground, and (3) propeller not fouled with sea weed or rope, and the drive pin hasn't sheared. This can save a lot of work.
- Broken Drive Belt**—If a replacement is not available, tie a piece of line or rope around the pulleys and secure it with a square knot.
- Broken Pipe or Hose**—Bandage the break with rags or a piece of canvas and tie it with a line or even a belt.
- Engine Oil Leak**—Simply catch the oil in a pan and pour it back into the engine.
- Taking on Water**—Check hull openings such as engine cooling water suction, head suction and discharge, galley drain and propeller shaft. Stuff blankets or a pillow into a damaged area. Wedge them down with a paddle if possible.

## Fuel Saving Tips

### MAINTENANCE

- Keep engine well tuned.
- Use correct propeller and check it for damage. A nicked or bent propeller slows down the boat and may damage the engine.
- Be sure the engine matches the boat. Check mounting for proper tilt.
- Use proper oil mix in motor. Pour fuel carefully. Reset cap tightly. Keep vent screws closed (when not operating) to prevent evaporation. Don't overfill—allow for heat expansion.
- Keep hull clean to reduce friction.

### ON THE WATER

- Drain all water before starting out.
- Distribute weight evenly. Unload excess gear. Don't overload with passengers.
- Shut off engine when at dock or at rest.
- Make fewer turns—they increase motor load.
- Plane smoothly and quickly at take-off, then throttle back to three-fourths when boat is planed. Most boats operate as well at three-fourths throttle and use half as much fuel. Also applies to water skiing.
- Plan fishing spots ahead of time. Use trolling motor for minor changes in location.



# Chapter 24 COURTESY

Water means freedom to many boaters. Abusing that freedom prevents shoreline property owners and other boaters from enjoying the peacefulness of open water and beaches. It also creates a need for more restrictive laws.

Boaters must respect the rights of shoreline property owners. These rights vary depending on movement of the water level. Generally, property rights extend to the water's edge.

The freedom to use water does not include the right to use private lands. Boaters must have prior permission from the owner to launch or moor a boat on private property.

Noise carries farther on water, especially at night. When anchoring off a waterfront home, keep voices down, play music low and leave with a minimum of noise. Be sure to consider winds, waves and tides. Don't anchor where the boat might drift too close to shore or to other boats.

Water pollution laws prohibit throwing or discharging refuse into the water. Carry a litter bag on the boat. Don't throw any garbage overboard for someone else to pick up.

High speed boating is dangerous in restricted or congested areas. The skipper is responsible for spotting and avoiding swimmers and slow moving vessels. This is also important when picking up or dropping off water skiers.

High speeds can produce high wakes. Boaters are responsible for all damage caused by their wakes. Slow down and watch your wake when approaching congested areas or small boats with low transoms.

Passengers should respect the skipper's wishes when onboard. The skipper is responsible for everyone's safety. Wear rubber-soled shoes when onboard. This prevents falls and keeps the deck from being scratched.

The skipper should make sure that one of the passengers knows how to handle the boat in case of an emergency.

Good skippers know the rules of the road and make sure they are followed. They use caution and consideration when mixing noise, speed and smoke with the gentle, refreshing and relaxing life on the water.



# Chapter 25 SECURITY

Lock it or lose it is the best advice for any boat owner. And sometimes just locking your boat isn't enough.

Boats are in great demand and most boat builders can sell boats faster than they can build them. With thousands of different models, but lots of look-alikes, it's easy for a boat thief to sell his loot to an unsuspecting buyer.

If someone offers to sell you a boat at a real bargain, be suspicious. If the price is too low, you may be getting a "hot," or stolen boat. Don't buy a boat or outboard motor unless the seller can provide a legal title.

Protect your boat against theft. If the boat is on a trailer, take off one trailer wheel and store it in the trunk of your car. Add a hitch lock so the trailer can't be towed away easily.

Don't leave ignition keys in the boat. Don't tie up at unattended or poorly-lighted docks. When you're not using your boat shut off the fuel line or remove

the battery. Install a hidden ignition switch. It isn't easy to steal a boat that won't run.

Paint your boat's name on the hull or transom. Painted letters or designs make it hard to resell the boat illegally. Manufacturers attach Hull Identification Number plates to new boats. The law requires these on all boats. Record your number and keep it in a safe place.

Keep extra equipment and accessories out of sight. Pull curtains, close up cabinets and take really important equipment home with you. Don't make it easy for a thief to steal your boat.

Boat thieves are serious about their trade and have been known to go to great trouble. One theft ring was uncovered when a boat owner spending the night aboard his boat at a public dock noticed a half-submerged garbage can drifting steadily against the current. It was full of stolen binoculars, radios and other accessories and was being pushed along by a burgling scuba diver.



# Chapter 26 STORAGE

Proper storage of your boat and trailer during the "off season" can make the spring fitting-out period a lot easier. And when you consider the headaches associated with dry rot, rusty trailer wheel bearings, rotten tires, water damage, mildew, and other problems, this can be very important.

Take canvas covers for example. They're nice because they keep your boat clean. But they shut in warm air and moisture, the two things that help mildew and wood rot get started.

To prevent mildew and wood rot, always leave part of the boat cover open so fresh air can circulate through your boat.

Trailer wheel bearings are a constant problem because water frequently gets into the hubs. It may not damage the wheel bearings during the boating season because it circulates around each time you use your trailer.

However, during winter lay-up, the water stays in contact with the same bearing surface for several weeks. This causes rust. Then when you use the trailer next spring, the rust causes friction, which causes heat, which causes the grease to run out, which causes more friction, etc. The bearings eventually burn out and you can get stuck out on the highway with a trailer breakdown.

Play it safe. Repack wheel bearings with grease at the end of each boating season. That way you'll be all ready to go in the spring.

Trailer tires need to be turned occasionally to prevent rot. For long lay-ups, it's a good idea to block the trailer up off the ground and remove the wheels.

It's also important to keep the trailer tongue higher than the rear end. This will allow rain water to run

out of the transom drain in the stern of the boat. If the trailer tongue is low, water collects in the bow of the boat damaging radios, fishing equipment, fire extinguishers, lights, and anything else that you've stowed there.

Changes in temperature can cause condensation on a fuel tank. Condensation will form on the inside of an empty fuel tank. So if you want to keep water out of your fuel, keep those tanks full.

Condensation can also form on boat engines, especially if the water jacket is empty. This causes rust and corrosion. So if you have a closed cooling system, don't drain it for winter storage. Instead, fill it up with antifreeze.

Boats with open cooling systems, like outboards and most stern drives, don't retain antifreeze very well. But they can be flushed with clean fresh water before winter storage.

Boats stored alongside a dock have additional problems. Mooring lines need chafing gear. And they need to be adjusted for all ranges of the tide. In northern states you may need a device to keep ice from forming around your boat.

If electric power is being taken from the dock, the polarity must be correct or else every metal fitting in contact with the water will be eaten away.

Leaving a small, tip-proof electric heater in the cabin will reduce the accumulation of moisture in the boat. And operating the engines once a week will keep the shafts and propellers turning freely and ready to go.

Important boating equipment like depth finders, radios, PFDs, first aid kits, etc. should be taken out of the boat and stored in a cool dry place ashore.



# GLOSSARY

## Can you find all 106 nautical terms hidden in the puzzle?

Words can be found across, down and diagonally on the page. Some terms are easy. If you can't find them all, look in the glossary for words marked with a dot.

### A

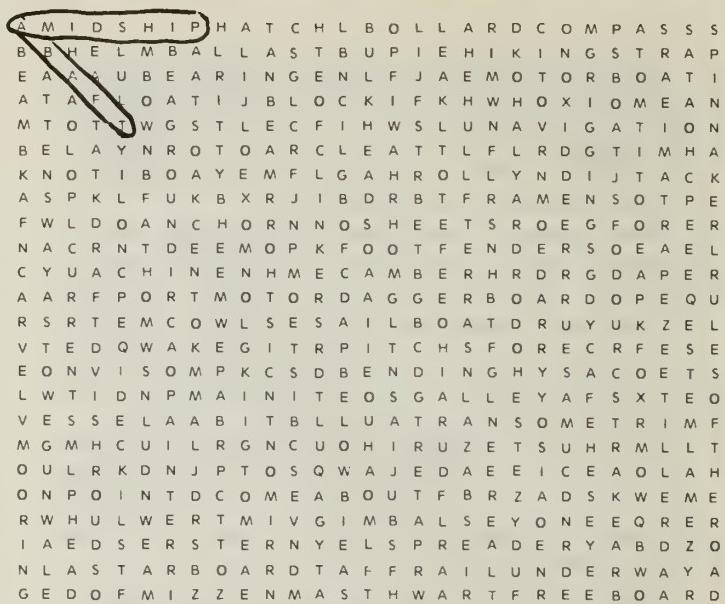
- **ABAFT** — Toward the stern.
- **ABEAM** — Amidship, at a right angle to the keel.
- **ABOARD** — On, in or into a boat.
- **AFLOAT** — On the water.
- **AFT** — Describing the after section of a vessel, or things to the rear of amidship and near the stern.
- **AGROUND** — Touching bottom.
- **AMIDSHIP** — Describing the mid-section of a vessel.
- **ANCHOR** — A forging or casting shaped to grip the sea bottom and, by means of a cable or rope, hold a boat in a desired position.
- **ASTERN** — Toward the stern. An object that is aft of a boat is said to be astern of the boat.
- **ATHWART** — Across.
- **AYE** — Yes, while aboard a boat or ship. Means I understand.

### B

- **BAIL (BALE)** — To remove water from a boat by pump or bailer.
- **BALLAST** — Heavy material such as iron, lead, or stone placed in the bottom of the hold, to keep a vessel steady.
- **BATTENS** — Thin strips of wood, plastic or other material set in pockets and sewed into the sail to hold or improve the set of a sail. On some racing boats the battens extend from leech to luff.
- **BEACON** — A post or buoy placed over a shoal or bank to warn vessels, also a signal mark on land.
- **BEAM** — Imaginary line amidship at right angles to keel of vessel. Also vessel's width amidship.
- **BEARING** — The direction or point of the compass in which an object is seen.
- **BELAY** — To make fast to a cleat or belaying pin; to cancel an order.
- **BELOW** — Beneath, or under, the deck. One goes below when going down into the cabin.
- **BEND** — To fasten by means of a bend or knot.
- **BILGE** — The lower internal part of a boat's hull, adjacent to the keelson.
- **BLOCK** — A device with sheaves, or pulleys, through which the direction of a sheet or line can be controlled and by which extra leverage can be obtained.
- **BOLLARD** — A strong post for holding lines fast.
- **BOOM** — A spar used to extend the foot of the sail.
- **BOW** — The forward part or front of the boat.
- **BULKHEAD** — Vertical partition in a boat.
- **BURDENED VESSEL** — Former term for the vessel which must stay clear of vessels with the right-of-way.

### C

- **CALKING; CAULKING** — Forcing filler material into the seams of the planks in a boat's deck or sides, to make them watertight.
- **CAMBER** — The arch of a deck, sloping downward from the center toward the sides.
- **CAPACITY PLATE** — Must be in full view of the operator's station. Gives maximum weight capacity and horsepower rating.
- **CAPSIZE** — To turn over.
- **CARBURETOR BACKFIRE FLAME ARRESTOR** — Required equipment on all motorboats except outboards and diesels. Reduces chance of fire caused by backfires in internal combustion engines.
- **CARDINAL POINTS** — The four main points of a compass.
- **CARVEL** — A system of planking in which the outside planking of a boat is flush. The edges meet, giving the shell a smooth surface.
- **CATAMARAN** — Boat with two narrow hulls connected by a deck, plus two rudders and two tillers.
- **CENTERBOARD** — A pivoting board or metal plate, housed in a slotted trunk, which can be raised or lowered. When lowered it reduces a sailboat's tendency to sideslip when tacking.



- **CHART** — A map of a body of water that contains piloting information.

- **CHINE** — The intersection of sides and bottom of flat or V-bottom boats.
- **CLEAT** — A piece of wood or metal with projecting ends to which lines are made fast.
- **CLINKER** — A method of planking in which the lower edge of each strake overlaps the upper edge of the strake next below. (Also called lapstrake.)
- **COCKPIT** — A well or sunken space in the afterdeck of a small boat for the use of the helmsman and crew. Forward cockpits are common in motorcruisers.
- **COME ABOUT** — To change course, or tack, in a sailboat.
- **COMPASS** — The instrument which shows the course of a vessel.
- **COWLS** — Hooded openings used for ventilation.
- **CURRENT** — The movement of the water in a horizontal direction.

### D

- **DAGGERBOARD** — A vertical sliding centerboard on a sailboat.
- **DECK** — Any permanent covering over a compartment.
- **DINGHY** — A small open boat.
- **DISPLACEMENT HULL** — Type of hull that plows through the water even when more power is added.
- **DOCUMENTED VESSEL** — Vessel registered with the U.S. Coast Guard.
- **DRAFT** — The depth of the vessel below the water line, measured vertically to the lowest part of the hull.
- **DRY ROT** — A fungus decay which causes wood to become soft and to fall apart.

### E

- **EBB** — The running out of the tide.
- **ESTUARY** — An inlet or arm of the sea.

### F

- **FATHOM** — Six feet.
- **FENDERS** — Objects placed along the side of the boat to protect the hull from chafing.
- **FLARE** — The outward spread of the boat's sides from the waterline to the rail at the bow.
- **FOOT** — The lower edges of a sail.
- **FORE** — Used to distinguish the forward part of a boat or things forward of amidships. It is the opposite of aft or after.
- **FORWARD** — Toward the bow.
- **FRAME** — Ribs of the hull, extending from the keel to the highest continuous deck.
- **FREEBOARD** — The vertical distance measured on a boat's side from the waterline to the gunwale. On larger vessels it is measured to the freeboard deck.



# GLOSSARY

**G**

- **GALLEY** — The kitchen area of a boat.
- **GIMBALS** — The brass rings in which a compass sets to keep it level.
- **GIVE-WAY VESSEL** — The one which must stay clear of vessels which have the right-of-way.

- **GUNWALE** — The upper edge of a boat's side. (Pronounced gun-nel.)

**H**

- **HALYARD** — A wire and/or line used to hoist and lower a sail, or the line used to hoist a flag or signal.
- **HATCH** — An opening in a boat's deck for persons or cargo to go below.

- **HEAD** — A marine toilet.
- **HELM** — The wheel or tiller by which a ship is steered.

- **HIKING STRAP** — A strap attached to floorboards or a centerboard trunk under which a crewman can hook his foot, allowing him to hike his body out over the side of the boat.

- **HULL** — The body of a boat.
- **HYPOTHERMIA** — A physical condition where the body loses heat faster than it can produce it.

**J**

- **JIB** — A triangular sail set on a stay, forward. A genoa jib is larger in size and is used for more speed.

**JIBE** — To tack before the wind in a sailboat, sometimes accidentally.

**K**

- **KEEL** — A permanently positioned, fore-and-aft backbone member of a boat's hull. Used for strength, stability and/or ballast.

- **KNOT** — To bend a line. Also, a unit of speed equal to one nautical mile (6,076.10 feet) an hour.

**L**

- **LEE** — The side opposite to that from which the wind blows.
- **LEECH** — The after edge of a fore-and-aft sail.

- **LEEWARD** — Situated on the side turned away from the wind. (Opposite of windward.)

**LEEWAY** — The amount a boat is carried leeward by the wind's force.

- **LIST** — Leaning or inclining of a vessel toward the side.

**LOG** — A record or diary of a vessel's journey.

**LUBBER'S LINE** — A mark or permanent line on a compass that shows the course of the boat.

- **LUFF** — The forward edge of a fore-and-aft sail. Also to cause the sail to flutter.

**M**

- **MAIN** — In all vessels it applies to the principal mast and sail.

- **MAINSAIL** — The largest sail hoisted directly on the mast.

**MAKING WAY** — Making progress through the water.

**MAST** — A spar set upright to support rigging and sails.

- **MIZZEN-MAST** — The aftermost mast of a ship.

- **MOORING** — Commonly, the anchor, chain, buoy, pennant, etc., by which a boat is permanently anchored in one location.

- **MOTOR** — A source of mechanical power.

- **MOTORBOAT** — Any watercraft propelled by machinery, whether or not such machinery is the principal source of propulsion.

**N**

- **NAVIGATION** — The art of conducting a ship from port to port.

**NUN BUOY** — A conical red buoy bearing an even number and marking the starboard side of a channel from seaward.

**O**

- **OAR** — A long wooden instrument with a flat blade at one end, used for propelling boats.

**P**

- **PAINTER** — A rope attached to the bow of a boat for making it fast.
- **PDF** — Personal flotation device.

- **PITCH** — The fore or aft movement as the bow and stern rise and fall due to wave action.

**PLANING HULL** — Type of hull that is shaped to glide easily across the water at high speeds.

- **POINT** — One of 32 points of the compass equal to 11½ degrees. Also, a sailboat's ability to sail close into the wind.

- **PORT** — The left side of a boat when you are facing the bow, also a destination or harbor.

**PRIVILEGED VESSEL** — Former term for the vessel with the right-of-way.

**PROPELLER** — Equipment piece connected to lowest part of drive shaft on all motors. It spins to move the boat.

**R**

- **RIGGING** — The general term for all the lines (ropes) of a vessel.
- **ROLL** — The sideward motion of a boat caused by wind and waves.
- **RUDDER** — A device used for steering and maneuvering, usually flat sheet metal attached to a stern or rudder post — not necessary on outboards because the unit can be moved to change direction of thrust.
- **RULES OF THE ROAD** — The regulations for preventing collisions on the water.

**S**

- **SAILBOAT** — A boat powered by wind and sails which may or may not have an auxiliary engine.

**SCOPE** — The length of the anchor rope or chain. 6 to 1 scope means that the length of the anchor rope from the boat to the anchor is 6 times the depth of the water.

- **SCUPPER** — A hole allowing water to run off the deck.

- **SHEETS** — Lines used to trim a sail to a desired position.

- **SHROUDS** — Those wires or lines that run down from a mast to the sides of the boat and serve as bracing.

- **SPAR** — General term for masts, yards, booms, etc.

**SPAR BUOY** — A channel marker that looks like a tall slender pole.

- **SPINNAKER** — A light sail, usually of considerable spread, roughly triangular and fully cut, which is hoisted forward of the mast and used for increased speed when reaching or running.

- **SPREADER** — A bar or strut that projects from a mast in order to spread shrouds or stays and give better support to a mast.

**STAND-ON VESSEL** — The vessel with the right-of-way.

- **STARBOARD** — The right side of a boat when you are facing the bow.

- **STERN** — The after end or back of a boat.

- **STEM** — The upright post or bar of the bow.

- **STOW** — To pack the cargo.

- **STRAKE** — Planks running fore and aft on the outside of a vessel.

**T**

- **TACK** — To come about, so that the wind from one side is brought around to the other.

- **TAFFRAIL** — The rail around a boat's stern.

**TIDE** — The alternate rise and fall of waters caused by the gravitational attraction of moon and sun.

- **TILLER** — A bar or handle for turning a boat's rudder or an outboard motor.

- **TRANSOM** — The transverse planking which forms the afterend of a small square-ended boat. (Outboard motors are usually attached to a transom.)

- **TRAPEZE** — A wire or rope secured near the top of the mast, with a seat or sling on its lower end. In strong breezes a crewman can support himself in the trapeze and extend himself out over the water to counteract the heeling force of the wind.

- **TRIM** — To arrange weights in a vessel in such a manner as to obtain desired draft at bow and stern.

**TRIMARAN** — Boat with three hulls, the center one the largest.

**U**

**UNBEND** — To cast-off or untie.

- **UNDERWAY** — Vessel in motion, i.e., when not moored, at anchor or aground.

**V**

- **VESSEL** — Every kind of watercraft, other than a seaplane on the water, capable of being used as a means of transportation on water.

**W**

- **WAKE** — Moving waves, track or path that a boat leaves behind it, when moving across the waters.

- **WAY** — Movement of a vessel through the water. Technically it is under way when not at anchor, aground or made fast to the shore. The common usage is interpreted as progress through the water: **Headway** when going forward and **Sternway** when it is going backwards.

**WELL** — Area at the rear of a boat where the motor may be located.

**WINDWARD** — Situated on the side closest to the wind. (Opposite of leeward)

# FINAL SKIPPER'S SCORE

## Instructions

When you have finished reading the text, cut out one of the FINAL SKIPPER'S SCORE answer cards located in the front of the book. Fill in the information requested on the card. Complete the FINAL SKIPPER'S SCORE by marking the box next to the question which indicates the best answer. Use a pencil or pen and fill in the first mark. Only one box should be checked for each question. Mail in the card for grading and processing.

## Multiple Choice Questions

1. For motorboats, proper lighting, a Certificate of Registration, fire extinguishers, Personal Flotation Devices, a flame arrestor, ventilation ducts and cowls, a muffler and a whistle are:  
 (a) suggested equipment.  
 (b) essential equipment.  
 (c) required equipment.  
 (d) items safety conscious skippers keep aboard.
  
2. Coast Guard approved Personal Flotation Devices:  
 (a) do not include ski belts.  
 (b) should be worn by all children and nonswimmers.  
 (c) should be checked periodically to be certain they are airtight and not torn, stiff or heavy.  
 (d) all three of the above are correct statements.
  
3. Properly displayed boat numbers must be at least three inches high, in bold, block letters and:  
 (a) be located near the water line  
 (b) match the color of the boat  
 (c) read from left to right  
 (d) read from right to left
  
4. Boats are classified according to:  
 (a) size and weight.  
 (b) make and model.  
 (c) horsepower and capacity.  
 (d) length.
  
5. If a fire were to develop on your boat, you should:  
 (a) maneuver to reduce the effect of the wind.  
 (b) direct the extinguisher at the top of the flames.  
 (c) turn directly into the wind.  
 (d) all of the above.
  
6. Regulatory markers with orange horizontal bands at the top and bottom:  
 (a) are used on international waters.  
 (b) are used in the Uniform State Waterways Marking System.  
 (c) are important in the Cardinal System.  
 (d) are part of the Lateral System.
  
7. The proper navigation lights for vessels (under both Inland and International Rules) must be displayed:  
 (a) only on boats over 40 feet.  
 (b) from sunset to sunrise and during periods of low visibility.  
 (c) from one hour after sunset to one hour before sunrise during periods of low visibility.  
 (d) from beginning to end of twilight.
  
8. If a boat capsizes:  
 (a) grab a PFD, swim to the boat and hold on.  
 (b) grab a PFD and swim to shore.  
 (c) grab a PFD and yell for help.  
 (d) swim away from the boat.
  
9. The best protection against fire in the engine compartment is:  
 (a) maximum ventilation.  
 (b) keep hatch closed at all times.  
 (c) minimum flow of air through compartment.  
 (d) install a fixed CO<sub>2</sub> system.
  
10. To begin mouth to mouth resuscitation, you should:  
 (a) place victim on back.  
 (b) clear mouth of foreign matter or any obstruction.  
 (c) pinch nostrils to prevent leakage of air.  
 (d) do all three of the above.
  
11. A buoy flying a red flag with a white diagonal strip indicates:  
 (a) first leg of a sailing race course.  
 (b) divers down - steer clear by at least 100 feet.  
 (c) ski slalom course - steer well clear.  
 (d) hatchery fish in area - proceed slowly.
  
12. Before starting an inboard engine, the engine compartment must be thoroughly ventilated to:  
 (a) clear compartment of possible gas vapors.  
 (b) give carburetor plenty of fresh air.  
 (c) cool brushes on the starter motor.  
 (d) blow sparks away from knife switches.
  
13. Which of the following types of fire extinguishers are Coast Guard approved?  
 (a) Foam  
 (b) Dry chemical  
 (c) Carbon Dioxide  
 (d) All of the above
  
14. Approved portable gasoline tanks should be filled:  
 (a) outside the vessel  
 (b) while keeping the nozzle or spout in contact with the tank  
 (c) completely so condensation can't occur  
 (d) a and b above
  
15. To avoid the chance of carbon monoxide poisoning:  
 (a) do not breath gasoline fumes while fueling.  
 (b) make sure the cabin is well ventilated.  
 (c) extinguish all gas lanterns, gas stoves or catalytic heaters before going to bed at night.  
 (d) follow b and c listed above.
  
16. The best first aid for a victim with a burn is:  
 (a) rub down with grease from outdrive unit.  
 (b) saturate area with any oil or grease.  
 (c) cover area immediately with wool blankets.  
 (d) dunk burned area in cold water.

# FINAL SKIPPER'S SCORE

17. If you fall into the water with heavy clothes on:  
(a) remove them immediately.  
(b) keep them on they help you to float.  
(c) remove them slowly.  
(d) they will make you sink rapidly.
18. You are approaching a dock where there is considerable boating activity. You hear one blast from an air horn. You know that:  
(a) you should stop.  
(b) an oil spill has occurred.  
(c) a dock fire is in progress.  
(d) a boat is turning to the right.
19. The most common characteristic of buoys in the Uniform State Waterway Marking System is:  
(a) their solid orange color.  
(b) their size.  
(c) the horizontal orange bands at the top and bottom.  
(d) the distinctive red and black horizontal stripes.
20. If a person falls overboard, you should:  
(a) stop the motor immediately.  
(b) swing the stern away by turning the wheel away from the side the person went over.  
(c) turn the wheel toward the side the person went over and toss a PFD.  
(d) report the accident immediately.
21. The best method of anchoring is to:  
(a) heave the anchor overboard by casting from the side of the boat.  
(b) stand on the bow and throw the anchor underhand away from the side of the boat.  
(c) lower the anchor over the side, hand over hand, until it hits the bottom.  
(d) tie up to a navigational aid.
22. A sailboat usually has the right of way over motorboats except:  
(a) when it yields to commercial vessels in narrow channels.  
(b) when the sailboat is the overtaking boat.  
(c) when it is under power.  
(d) all three of the above.
23. An approved back-fire flame arrestor is required:  
(a) to reduce the chance of fire on all motors.  
(b) on all boats over 16 feet.  
(c) on all gasoline engines, except outboard motors.  
(d) on all motorboats.
24. Which of the following is the least important to check before pulling a trailer?  
(a) safety chain on trailer hitch.  
(b) lights and reflectors.  
(c) boat's priming bulb.  
(d) car and trailer tire pressure.
25. A boat being overtaken has the right of way. It must:  
(a) maintain course and slow down.  
(b) move to port.  
(c) hold course and speed.  
(d) move to starboard.
26. The number one cause of fatal boating accidents is capsizing. It is primarily caused by:  
(a) overloading and improper loading.  
(b) high speed turns and overpowering.  
(c) foul weather.  
(d) all three of the above.
27. Waterskiing is a team sport consisting of:  
(a) a good skier, good skis, and an observer.  
(b) an experienced skipper who allows the skier to control the boat's direction by hand signals.  
(c) the skipper, the skier and an observer to relay signals.  
(d) the skipper, the skier and the tow boat.
28. Manually propelled vessels such as rowboats or sailboats less than 22'9" (7 meters) operating at night must:  
(a) show a white light on the bow.  
(b) show a white light on the stern.  
(c) show a red and green combination light on the bow.  
(d) show a white light to prevent collision.
29. In a crossing situation, the give-way vessel:  
(a) signals with one short blast and gives way.  
(b) keeps clear of the stand-on vessel.  
(c) passes astern of the stand-on vessel.  
(d) all three of the above.
30. A Certificate of Number:  
(a) tells the passenger capacity.  
(b) determines the boat's classification.  
(c) must be carried on board whenever the boat is being operated.  
(d) must be displayed on the transom.
31. Regulations require wearable PFD's be "readily accessible." This means:  
(a) each person is issued one upon boarding.  
(b) it must be easily reached by each person.  
(c) they should be locked in boxes on deck.  
(d) one must be under each seat.
32. A boat intending to turn to starboard would signal with:  
(a) 2 short blasts.  
(b) 1 short blast.  
(c) 1 long blast.  
(d) 1 long blast and 1 short blast.
33. The capacity plate:  
(a) is located on the bulkhead.  
(b) tells maximum load and horsepower rating.  
(c) tells the weight of the vessel.  
(d) tells how many PFD's must be on board.
34. Steering and sailing rules deal with three situations which are:  
(a) meeting, reversing and crossing.  
(b) crossing, overtaking and negligence.  
(c) meeting, speeding and starting.  
(d) meeting, overtaking and crossing.

# FINAL SKIPPER'S SCORE

35. In a crossing situation, when two boats are approaching each other, the boat to starboard:  
(a) has the right-of-way  
(b) does not have the right-of-way  
(c) must slow down  
(d) none of the above
36. Under the Uniform Waterways Marking System a white buoy with an orange diamond in the middle indicates:  
(a) danger - steer well clear - may mark rock or shoal.  
(b) unlawful - keep out - marks swim area.  
(c) controlled area - slow, no wake.  
(d) unlawful - keep out - private property.
37. On the water, the boat with the right of way:  
(a) is the give-way boat.  
(b) is the stand-on boat.  
(c) is any boat overtaking another boat.  
(d) is the boat holding course and speed.
38. At night a boat's navigation lights:  
(a) indicate the speed.  
(b) tell if you are in an overtaking, crossing or meeting situation.  
(c) are red, blue and green.  
(d) indicate the boat's classification.
39. Persons riding on a gunwale or decked over bow:  
(a) Interfere with stability  
(b) Interfere with visibility  
(c) May fall overboard  
(d) All of the above
40. Buoys are used to mark channels when proceeding upstream or when entering a harbor. Which of the following buoy identification is *incorrect*?  
(a) can buoy; color black or green; number odd; marks port side of channel.  
(b) can buoy; color red; number even; marks port side of channel.  
(c) nun buoy; color red; number even; marks starboard side of channel.  
(d) spar buoy; no number but may have letter; black and white vertical stripes; marks middle of channel.
41. One approved Type I, II or III wearable personal flotation device is required for each person on board, or being towed on water skis etc.  
(a) only for boats less than 16 feet.  
(b) only for power boats over 16 feet.  
(c) for all watercraft, including rowboats, canoes and kayaks.  
(d) only for sailboats.
42. A small craft advisory warning is:  
(a) a black square  
(b) a red triangle  
(c) a red square  
(d) yellow triangle
43. Pleasure boats are restricted to lights that are:  
(a) red and green only.  
(b) white only.  
(c) red, green and white only.  
(d) red, blue, green and white only.
44. The operator of any vessel involved in a boating accident must notify the nearest peace officer if:  
(a) someone is killed  
(b) someone is injured  
(c) property damage is \$100 or more  
(d) any of the above
45. Boats under 26 feet (8 meters) with a closed compartment that do not have a fixed fire extinguishing system:  
(a) must carry at least one B-I type approved hand portable fire extinguisher.  
(b) must carry at least two B-I type approved hand portable fire extinguishers.  
(c) must carry at least two B-II type approved portable fire extinguishers.  
(d) must carry at least one B-II type approved portable fire extinguisher.
46. When pulling away from the lee side of the dock a boater should:  
(a) first cast off the lines.  
(b) use an oar or paddle to push the boat clear of the dock.  
(c) let the wind carry the boat out.  
(d) do all three of the above.
47. The first duty of a good skipper is:  
(a) to obey the rules of the road.  
(b) the safety of the passengers, crew and boat.  
(c) to be alert for all danger.  
(d) to help others in distress or danger.
48. A motorboat's length is measured from:  
(a) end to end parallel to the centerline.  
(b) bow to outboard motor brackets.  
(c) end to end, including all fittings or attachments.  
(d) inside hull planking to the transom.
49. For best control of your vessel while maneuvering you should work:  
(a) with wind and current at right angles to each other.  
(b) with your bow into the wind and current.  
(c) with the wind and current at your stern.  
(d) with no regard for wind and current.
50. After the cruise is over, the most important thing to do is:  
(a) remove all litter from the boat and place in a litter container.  
(b) contact whomever you left your boating float plan with so that they know you have returned safely.  
(c) wash down and clean up the boat.  
(d) dry out any equipment that might have become damp.

# MASSACHUSETTS PUBLIC BOAT LAUNCHING SITES

Site	Location	Site	Location
Alum Pond.....	Sturbridge	Little Mystic Ch.....	Charlestown
Apponaganset River.....	Dartmouth	Long Pond .....	Freetown, Rte. 18
Ashumet Pond.....	Falmouth	Long Pd. & Little Long.....	Plymouth
Asnacomet Pond.....	Hubbardston, Rte. 62	Lovell's Pond.....	Barnstable
Lake Attitash.....	Merrimac	Lynn Harbor .....	Lynn
Baddacook Pond.....	Groton	Manchaug Pond .....	Sutton
Barton's Cove .....	Gill, Rte. 2	Mascopic Lake .....	Tyngsborough
Bass River .....	Yarmouth	Mashpee-Wakeby Pd.....	Mashpee
Benedict Pond.....	Monterey	Merrimac River .....	Lawrence
Black Rock Creek.....	Salisbury	Lake Nippenicket .....	Bridgewater
Bondi's Island, Conn. R.....	Agawam, Rte. 5	Otis Reservoir .....	Otis
Lake Buel.....	Monterey, Rte. 57	Oxbow, Conn. R.....	Easthampton
Cashman Park.....	Newburyport	Pamest River .....	Truro
Charles River.....	Brighton	Pease Park .....	Fairhaven
Lake Chauncy.....	Westborough	Peters Pond .....	Sandwich
Chebacco Lake.....	Hamilton	Pontoosuc Lake .....	Pittsfield
Cliff & Little Cliff Pds.....	Brewster, Rte. 6A	Porter River .....	Danvers
Coles River.....	Swansea	Quaboag Pond .....	Brookfield
Congamond Lakes.....	Southwick	Richmond Pond .....	Richmond
Connecticut River.....	Hatfield	Rock Harbor .....	Orleans
Danvers River.....	Peabody	Rock Pond .....	Taunton
Deerfield River.....	Charlemont, Rte. 2	Sagquatucket Harbor .....	Harwich, Rte. 28
Delaney Pond.....	Stow	Sconticut Neck .....	Fairhaven
East Bank, Conn. River.....	Chicopee	Sesuit Harbor .....	Dennis
East Branch, Ware River.....	Rutland	Shaw Pond .....	Otis
East Brimfield Reservoir.....	Sturbridge, Rte. 20	Sheep Pond .....	Brewster, Rte. 124
Falls Pond.....	Attleborough	Short Wharf .....	Mattapoisett
Flagg Pond.....	Shrewsbury, Rte. 20	Shubael Pond .....	Barnstable
Flint Pond.....	Tyngsborough	Singletary Pond .....	Millbury
Fort Pond.....	Lancaster	South Watuppa Pd.....	Fall River, Rte. 24
Green Harbor.....	Marshfield	Squannacook River .....	Pepperell
Green Pond.....	Falmouth	Sugden Reservoir .....	Spencer
Hardwick Pond.....	Hardwick	Upper Spectacle Pd.....	Sandisfield
Highland Lake.....	Goshen, Rte. 9	Wallum Lake .....	Douglas
Hood Pond.....	Ipswich	Westport River .....	Westport, Rte. 88
Ipswich Town Pier.....	Ipswich	Weweantic River .....	Wareham, Rte. 195
Jerricho Road .....	Scituate	Weymouth Back River .....	Weymouth
John's Pond .....	Mashpee	Whalom Pond .....	Leominster
Katama Point .....	Edgartown	Whitehall Reservoir .....	Hopkinton, Rte. 135
Knops Pond .....	Groton	Windsor Pond .....	Windsor
Lagoon Pond.....	Tisbury	Winthrop Harbor .....	Winthrop
Laurel Lake.....	Lee, Rte. 20		

Division of Marine  
and Recreational Vehicles  
100 Cambridge Street  
Boston, Massachusetts 02202

# CONTINUE YOUR BOATING SAFETY EDUCATION



## U.S. Power Squadron Courses

The U.S. Power Squadrons are a nationwide boating education organization which offer an extensive boating course to the public free of charge. Lessons include:

1. Handling Under Normal Conditions
  2. Handling Under Adverse Conditions
  3. Seamanship and Common Emergencies
  4. Rules of the Road
  5. Aids to Navigation
  6. Compass and Chart Familiarization
  7. Running Lights and Equipment
  8. Boat Trailering
  9. River Boating
  10. Mariner's Compass and Piloting
- For class information, call your nearest Power Squadron office.



## American Red Cross

Local chapters of the American Red Cross offer instruction in various phases of boating, sailing, and water safety. For the beginner, both classroom instruction and on-the-water training are offered in basic rowing, sailing, canoeing, and outboard boating, as well as courses in basic first aid and water safety.

For the enthusiast, advanced instructor training in *Small Craft Safety, First Aid and Water Safety* are available.

For information on any of these safety courses call or write the Community Services division of your local Red Cross Chapter.



## White Water and Paddling Activities

To obtain information about white water fun or canoeing, contact one of the associations listed here or write to the local agency in your state handling outdoor recreation.

United States Canoe Association, Inc.

1818 Kensington Blvd.  
Fort Wayne, IN 46805

American Canoe Association  
P.O. Box 248  
Lorton, VA 22079

American Whitewater  
Affiliation  
P.O. Box 1483  
Hagerstown, MD 21740



## U.S. Coast Guard Auxiliary

The Coast Guard Auxiliary offers interested persons a chance to acquaint themselves with the best practices of small boat handling and seamanship through public instruction courses. The Auxiliary courses are taught nationwide by experienced boatmen using slides, movies and demonstrations.

Each of these courses is presented free: *Outboard Motorboat Handling* (1 lesson), *Safe Boating* (3 lessons), *Principles of Safe Sailing* (7 lessons), *Boating Safety and Seamanship* (13 lessons).

At the successful completion of each course, you are entitled to the Auxiliary Small Boat Seamanship Certificate.

Contact your local Coast Guard Auxiliary office for information.

